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Classified Advertisements—Official Notices—Tenders—Supp. 21.
Index to Advertisers—Page xiii.

Principal Contents:

	PAGE
A Science of Tariff Making?	305
Load Building in Yorkshire—II	307
Hydro-electric Possibilities in North China. By Prof. C. A. Middleton Smith	309
Scientific Cooking. By G. F. Sills	311
Last Days at the Fair	313
Meetings and Discussions	316
Correspondence: Municipal Chief Engineers; Refusal to Connect; Boiling Plate Characteristics; Applying for an Appointment; Terminating Cable	319
New Apparatus and Devices	321
The Supervisors' Dinner	324
Business and Industrial Notes	325
Electricity Supply	329
Traction	330
Contract Information	332
Notes	333
Our Personal Column	334
Financial Section	335
Published Specifications	339
New Work for Contractors	340

A Science of Tariff Making?

Equity and demand

ONE of the early handicaps in the development of electricity was the prevalence of a fallacy. This fallacy was that the work of framing charges to consumers was so specialised in character that it had little to do with the science of economics. This view, no doubt, originated in the complexity of the technical factors involved in determining costs of production, upon which the price of supply is ultimately based. It failed, however, to take fully into account the other half of the case, namely, demand.

A product of this way of looking at things was the old heresy of the "equitable" tariff, which was supposed to be scientific because each item of the cost was, as nearly as practicable, reflected in the selling price, whatever might be the value of the service to the user. So opposed were some to the ethics of the railway maxim of "charging what the traffic will bear" that they attempted to charge certain classes of "traffic" a good deal more than they could bear.

The importance attached to production gave rise to the conception of any given load as desirable when it led to the filling up of the dips in the load curve. It was improvement in operating efficiency rather than the opportunity provided to secure a load at low rates that was the first consideration. Predominance was also given officially to costs by the "undue preference" clauses in the 1882 Act.

While some kind of official price regulation is called for owing to the semi-monopolistic character of electricity supply, it should be borne in mind that the economic warrant for this is to prevent an undertaking establishing an undesirable equilibrium between supply and demand. This might otherwise occur at a point where the sale of a few kWh at a high price would furnish as good a revenue as the sale of a large number at a low price.

The demand for domestic electricity has resulted in a crop of statistics compiled from experience which justifies the faith that this load can be catered for at prices that the householder will pay, and the latter aspect is, therefore, receiving more attention nowadays.

A philosophic basis for the economics of tariff making, which supports broadly the most progressive practice, has been worked out by Mr. D. J. Bolton in a paper contributed to the last number of the *Journal* of the Institution of Electrical Engineers. Probably the most important section of this relates to an appraisal of the value of elasticity of demand. In this is discussed the response of growth of consumption to change of price in its wide variations for different uses, lighting and space heating being at opposite ends of the scale. Such studies are a necessary preliminary to visualising the beginnings of a science of tariff construction, but do not, as Mr. Bolton himself says, promise that price fixing will become an "exact science." Academic rigidity is especially to be deprecated in estimating the prospects of our own progressing industry, and it becomes necessary to be able to forecast what the public demand will be in the future.

To some extent electrical men can shape this demand. The early economists stated that demand created supply. That is the whole truth only when conditions are static. To-day it is recognised that supply can and does create demand as one of its major functions, especially when the industry is as fluid as our own. Instances are to be found in the employment of publicity methods to persuade the public to use more electricity and the provision of apparatus on easy terms to enable it to do so. These may sometimes be more effective than price reduction.

Most of this activity is in the wide field in which electricity can be substituted for other existing methods. More difficult to foresee is the effect of an even greater demand that will follow the devising of new ways of using electricity for doing things that cannot be accomplished by any other means.

Improvements Needed

THE British Industries Fair ends today and, as always, leaves many questions in its wake. The usual suggestion that February is the wrong time for the Fair has again been heard, but there are strong reasons for continuing the custom. Some exhibitors wonder whether the importance of the Fair as a means of obtaining export orders is sufficiently realised by the organisers nowadays. Well, a great deal of money is spent abroad in advertising the Fair in advance, but perhaps foreign visitors are not too well catered for. The "amenities" at Birmingham have again been called in question. Although the huge buildings at Castle Bromwich are in use for only a fortnight during the year, they have become a permanent institution and really should have something better than the makeshifts which are found there. Surely manufacturers would jump at the chance of providing equipment for actual service as the best means of exhibiting it. We urge the Birmingham Chamber of Commerce to ponder over these matters during the next few months, for there are signs of restiveness among both exhibitors and visitors.

About Everything Else

IT was an inspiriting survey of the electrical industry that the Minister of Transport gave at the B.I.F. official luncheon on Tuesday. Dr. Burgin had something to say about all branches of it save one. The exception was distribution. His reference to the benefits derived from the grid might lead one to suppose that he expected similar results from a reorganisation of distribution. Whether such is likely to be the case depends, of course, upon what the prospective Bill holds in store, but the features in the co-ordination of generation that the Minister showed to be most effective are absent from distribution and cannot be regarded as a guide. Dr. A. H. Railing spoke for all when he assured Dr. Burgin that those in the electrical industry will be in favour of any proposals that would be to the benefit of its customers; indeed, only in that way can the interests of the industry and its employés be served in the long run.

No Bill Yet

REPLYING to a question in the House of Commons on Tuesday, the Prime Minister said that owing to the Government's heavy programme it would be impossible to introduce the new Electricity Bill this session. It was probable that the Bill would make its appearance early in the new session, *i.e.*, in October or November. So the industry must maintain its attitude of anxious anticipation. It is to be hoped that this further postponement, which was not unexpected, will not act as a brake upon progress. Difficult though it is for those who were recommended for extinction by the McGowan Committee to carry on with a good heart, they should not relax their efforts which may yet prove to be their salvation.

A Helpful Suggestion

A WRITER in an evening contemporary suggested last week that "the Central Electricity Board should be absorbed by the electricity supply industry," as it cannot possibly achieve the purpose for which it was formed. If this means that it will not bring about the universal halfpenny unit which one of our contemporary's friends used to say was the Board's aim it is probably true. Otherwise the statement requires some modification. But what is proposed? That the grid should be divided up between a hundred or so authorities? The Board has nothing else of a tangible nature to be absorbed. The London J.E.A. is also similarly treated by the writer, but it will be news to the South Metropolitan Co. that it belongs to the J.E.A. Is the suggestion in this case that the small and expensive undertakings acquired by the Authority shall again stand alone? The consumers might have something to say about this.

Anglo-American Negotiations

BRITISH industrialists have so far failed to elicit from the President of the Board of Trade any information regarding the classes of manufacturers likely to be affected by the Anglo-American negotiations for a trade agreement. On the other hand, their American opposite numbers have been in possession of a list of such products for some time (see our issue of January 28th, p. 135). That list includes several kinds of electrical manufactures, and we are not surprised to learn from the *Electrical World* (New York) that many American electrical manufacturers are opposed to the lowering of the tariff on foreign-made electrical apparatus and machinery. The matter is under consideration by the National Electrical Manufacturers' Association, and it is expected that recommendations will be submitted to Washington.

The Operating Theatre

ANY greater risk attending the use of modern anæsthetics (which are generally more inflammable and explosive than those formerly used) is likely to be materially reduced as a result of the investigations that led up to the I.E.E. papers of Professor W. M. Thornton and Dr. E. H. Rayner. These papers are especially notable on two counts. In the first place, they represent the sponsoring by the Institution of electrical work that was primarily needed for the information of other professional bodies. Secondly, the surgeons and anæsthetists, as guests of the Institution, contributed very materially to the value of the discussion by enlightening electrical engineers on several questions that call for consultation between the two professions in the public interest. It is to be hoped that precedents of this kind, as further exemplified by the voluntary joint effort of the X-ray and Radium Protection Committee will be followed in other directions.

Supervising Engineers

THREE points of immediate practical importance were raised by speakers at the A.S.E.E. dinner. The first was a direct appeal by Mr. J. R. Beard to Sir Cyril Hurcomb, the new chairman of the Electricity Commission, to do something about standardising voltage at 230. The next was the reference by Mr. H. A. Crabtree to the need for compulsory wiring regulations and registration, which was received with significant indications of approval by those present. Lastly, Mr. H. W. Swann suggested that the Association should investigate the problem of securing good earth leakage paths. It was important, he urged, to detect conditions likely to cause fire (and suitable instruments are available for the purpose) instead of discovering them later.

Facilitating Change-overs

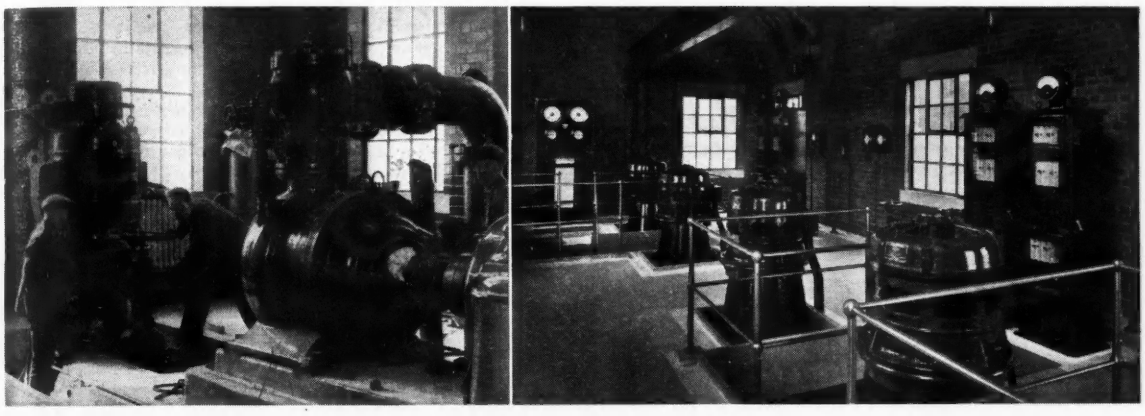
IN a case at Bromley last week it was mentioned that a man who wished to have a gas cooker removed sent his request to the gas company on a printed card which "appeared to have been specially supplied from some outside source." We have received one of these cards from the Erith Electricity Department, which apparently uses them to speed up the process of changing from gas to electricity. It calls upon the gas company to:—"1. Take down and remove all gas-lighting fittings belonging to your company. 2. Disconnect and remove gas cooker. 3. Cut off all gas from the house and remove all fittings which may belong to the company." On the other side the name and address of the gas company are printed. While the Electricity Department is perhaps to be commended for its thoroughness, it should bear in mind that such a postcard can be a two-edged (or is it four-edged?) sword. In the case in question the defendant had certain obligations to the company (although it was merely a gas company) and had to pay up. The Electricity Department may find itself involved in similar difficulties if any of its cooker users are so misguided as to want to change over to gas.

Load Building in Yorkshire.—II

Further notes on Y.E.P. activities

In our issue of February 11th we gave an idea of the magnitude of the operations of the Yorkshire Electric Power Co. as observed by us during a recent tour of the company's 2,700 sq. mile area. We briefly described a variety of industrial installations served by the company. In this issue we continue the story and make some reference to the "domestic" work which the Y.E.P. has carried out with an indication of the methods employed.

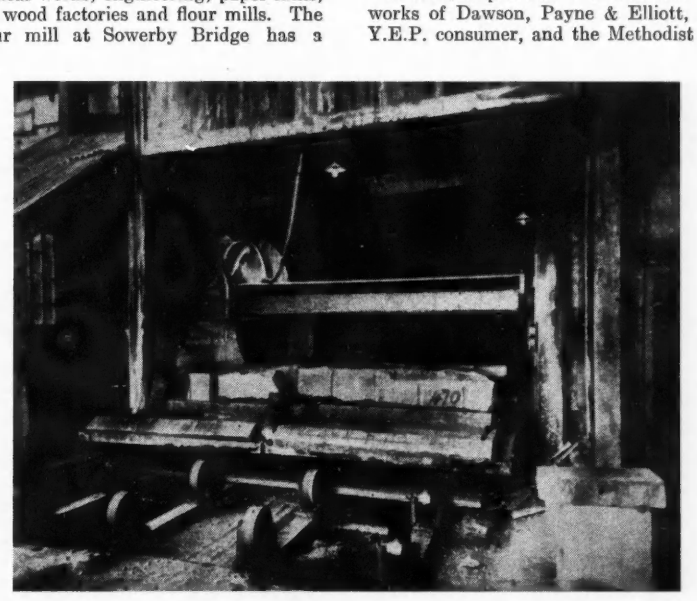
PROCEEDING on our journey we came to the Bamford district, near Hope, where a water supply scheme represents a load, which, although temporary, is substantial and possesses valuable diversity factor. We refer to the Ladybower Reservoir construction which is now in progress for the Derwent Valley Water Board. A supply of 500 kVA is being given for constructional purposes, and the uses to which it is put are service to cranes, pumps, telphers, concrete mixers, air compressors, crushing and lighting. It is about a five-year construction scheme. Eventually, the villages of Derwent and Ashopton will be submerged and the reservoir will have a capacity of 5,000 million gal; it will serve Sheffield, Leicester, Nottingham and Derby. The method of construction is by earth bank dam, the oldest known method and one of the most satisfactory. When completed and linked up with the existing reservoirs of the Water Board the whole will be the largest chain of artificial reservoirs in this country.



Two pumping installations:—Left: Borehole and high-lift pumps at Austerfield. Right: Sewage and storm water equipment at Castleford

Other industries to which a good deal of energy is supplied are breweries, chemical works, engineering, paper mills, glass works, wire works, wood factories and flour mills. The Co-operative Society flour mill at Sowerby Bridge has a demand of 1,000 kVA, and at a good load factor, too. Glass-making is an important Yorkshire industry, and practically every works is a Y.E.P. consumer. An interesting glass development is electric melting and spinning in the production of glass wool.

One of the largest railway wagon works is in the company's area. Chas. Roberts & Co., Ltd., at Horbury Junction, are producing 120 steel and wood wagons of all sizes per week, including the modern 20-ton main-line units and some special ones for iron ore and other materials of up to 40-ton capacity. About 4 million kWh per annum is consumed, and the biggest motors are 300 h.p. for air compressors and 150 h.p. for hydraulic pumps.



Diamond saw at Kiveton Quarries driven by a 25-h.p. motor

The Manchester-Sheffield railway electrification scheme will add usefully to the load and diversity. Orders have been placed by the Railway Company for electrical equipment, and supply will be given at several points.

At Arthington the Golden Acre Amusement Park improves the general diversity of load; a supply is given for motor drives for water chutes and roundabouts, and the lighting is considerable. There is no ordinary industry in this district, but all the houses are consumers.

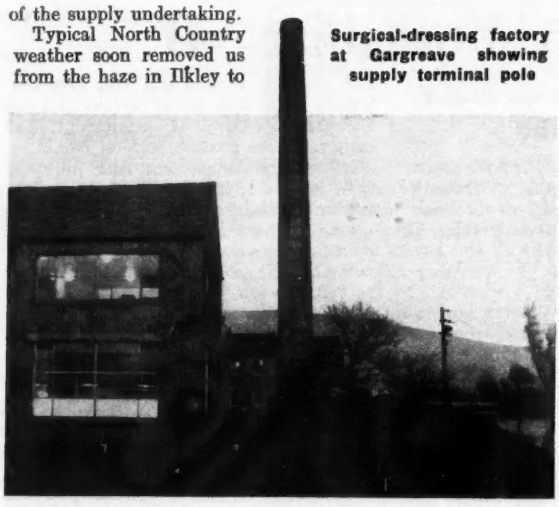
We were soon following the Wharfe, the fastest-flowing river in Yorkshire. In the valley below on our right amidst the Wharfedale beauty spot, of which the Y.E.P. and Yorkshire generally are proud, the river's characteristics have resulted in quite a number of hydraulic installations to supply the needs of local mill owners, but these supplies are mostly now supplemented by public supply because of the considerable frequency of flood and drought periods. Surprise View was true to its name just before we entered Otley from a position about 500 ft. above sea level, and, apart from the æsthetic note, we could just see a point of interest to the electrical industry generally in the insulating-paper factory of Whiteleys at Pool. Whiteleys now demand about 2,000 kVA and use something like 5 million kWh annually. As in the case of a number of other mills, water power and public supply are coupled together in this factory. Judging from the smoke which overhung Otley as we descended to this very old town of Yorkshire stone past the gateway to Wharfedale, it appeared to be wholly industrial. Actually in the town, however, quite a different impression was obtained. The printing machinery works of Dawson, Payne & Elliott, Ltd., is an important Y.E.P. consumer, and the Methodist church claims to possess the finest organ in the district; it has been electrically operated for many years. As we left the town we had a glimpse of Duncan Barraclough's mill, a large consumer.

Burley-in-Wharfedale is a pretty little town which can hardly be called a power area, but it has one mill with two very fine steam engines supplemented by water power. The undertaking has its eye on the engines, which it knows must be overloaded because of water troubles of late.

Ilkley, a few miles farther north-west, is definitely a residential and health resort. Half-way up the hills on the left leading to the moors the staggered and stepped hotels look picturesque, but although quite a number of them still have their own little generating sets, generally they are rapidly yielding to the blandishments

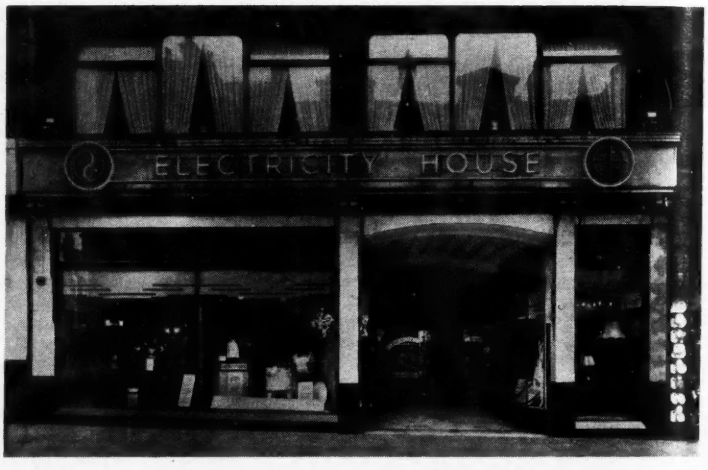
of the supply undertaking.

Typical North Country weather soon removed us from the haze in Ilkley to a burst of sunshine in Addingham, where the prime industry is textile and there is a branch of Lister's. Two mills are both connected with the Y.E.P. system, and although one has water power the extreme rise and fall of the river results in the use of the undertaking's supply entirely at times. Some of the mills tucked away behind the houses here reminded us of Priestley's mills, where the owner lives on the premises. Near Bolton Abbey, an attraction for many sightseers, one of the local reservoirs and considerable snow on the high ground were points of interest during the next mile or two, during which we were getting near Skipton, where the peaks from the Ice Age present a rugged aspect in a part of North England dear to the hearts of geologists.



Surgical-dressing factory at Gargreave showing supply terminal pole

The ride through wilder country brought us to Skipton, the town famous for Dewhirst's cotton and of historical interest because of the castle, which dates back to the 11th century. Gargrave was the end of our trip. Its purity of air results from the screening of the westerly winds by the Pennines, and has resulted in the establishment of the surgical-dressing factory of Johnson & Johnson (Great Britain), Ltd., on the bank of the River Aire. There is a demand of about 500 kVA at this factory devoted to the special processes relating to the production of bandages and dressings. In a department for the production of ligatures we saw small electric ovens for drying gut and coiling machines for winding dental floss. An opening and cleaning department for dealing with raw cotton has a 30-h.p. drive. Centrifugal machines deal with the material after bleaching. The dried cotton from the dryers is dealt with in finishing scutchers and on a carding equipment; 30-h.p. and 25-h.p. motors drive the carding machines and the doubling frames.



Electricity House, Bradford

A cooker demonstration "on site"

Mr. Parker, manager of the factory, spoke highly of electricity as "suiting our type of load." "It is better and cleaner than steam and saves belting," he said. Practically all the power transmission is by short centre "Texrope" drives.

The undertaking has established three essentials for the successful building of domestic load—(1) a tariff suited to the purpose for which the electricity is to be used, with a running charge designed to encourage use; (2) adequate wiring and assistance to owners to bring up to standard the wiring in existing property; (3) availability to the consumer of the right apparatus at an attractive price. Electricity House, Ltd., has been established to meet this last requirement. Further, great importance is attached to safeguarding the public, and all types of apparatus are tested in the laboratory and only offered for sale if they are "up to standard."

One-third of the whole capital value of the undertaking is represented by the low-voltage networks, and yet the load factor of this section of the system is only 10 per cent., as compared with 65 per cent., 40 per cent. and 25 per cent. for generation, primary and secondary transmissions, respectively. This rather startling revelation is likely to influence domestic load building a good deal in the future, for to bring up the load factor of the high-capital section the company is introducing the high-frequency impulse controlled system of hot-water supply, with electricity at three kWh a penny. The heaters can be cut off a distributor when the load is too high and reconnected again when the load falls. The result of heating *all* his hot-water electrically is to double the domestic consumer's consumption. That leads to the question, "Will the network stand it?" but the power company anticipates that it will have to greatly increase the number of feeding sub-stations—already over 1,000. Mr. Woodhouse thinks that in a few years the domestic load will be something quite beyond anything yet visualised.

Canvassing is the main plank in the domestic load-building work. The canvasser is looked upon as a salesman, and his job is to obtain new consumers and to build up the load of each existing consumer. If the first canvass of a district shows that there are interested people, these are again canvassed in a reasonable time. Although some areas are not so responsive as others, it has been found that constant canvassing definitely builds up load. Accordingly, records of the existing consumers show the low-percentage areas and guide the canvasser in the frequency of his visits. All types of domestic load are dealt with by the same canvasser as a whole, specialisation not being indulged in. Canvassing is done from the districts under the instructions of head office. There is a team of canvassers in each district under a supervisor. The importance of organising the canvassing staff by locality lies in the fact that a canvasser in one district is looked upon by the consumers as a permanent official to whom they can go with any of their supply problems. The commercial load is catered for in exactly the same way as the domestic load.

Street Lighting as a Beginning

Endeavours are made in all new districts to interest the local authority in up-to-date public lighting, and advice is given by a street lighting specialist. Street lighting is often taken advantage of to justify a general supply to a new village or district where the initial demands were so poor as to leave the proposition in some doubt. In the case of the area of the Isle of Axholme R.D.C. the adoption of electric street lighting has resulted in the supply of electricity to practically the whole of the area for general purposes. The area embraces fourteen villages.

If, as the result of inquiries, it is deemed desirable to develop a new village, a survey is first made to ascertain what is likely to be the immediate demand for domestic and other purposes. As a result of this survey a loading table is prepared which tells about how many consumers are likely to be obtained during the first year's operation and their demand for elec-

tricity. At the same time an estimate is made of the probable number of consumers and their demand for electricity ten years hence. This assures the undertaking that in preparing a scheme of distribution it need have no fear that in the future it will experience any difficulty with regard to voltage regulation. In other words, the undertaking makes sure initially that sufficient copper is put down for distribution purposes. The forecast for ten years hence can, as a result of experience, be made fairly accurately.

At the time of the survey many inquiries are made from the housing authorities as to future developments. After the estimate is obtained of the district's demand a canvass is instituted to ascertain what will be the actual demand. The residents are interviewed and the undertaking's alternative charges are explained, the applicant being assisted in every way in choosing the tariff best suited to his requirements. The company's hire-purchase schemes and assisted wiring schemes are also explained. Great importance is attached to making every effort not to stultify load-building by high service charges, and the company more often than not is willing to spend capital which is not immediately remunerative. Generally two sizes of cable, 0.1 sq. in. and 0.15 sq. in., are standardised. Five-core cable is laid in all the distribution networks, so that street lighting supply and control can be immediately provided at any future time. When there is an expansion of load at the end of a system it tends to cause voltage trouble. Such difficulties are overcome by providing additional high-voltage feeds into the mains.

Sodium street lighting in Mytholmroyd

We are indebted to Mr. W. B. Woodhouse, managing director, and members of his sales staff for co-operation and assistance in collecting the above information.

Hydro-electric Possibilities in North China

By Prof. C. A. Middleton Smith, M.Sc.(Hong Kong)

Although most of China's 20 million h.p. of water power is inaccessible there is scope for development

"NO good work is ever lost." That is the recorded belief of Max Muller and it is one of the articles in the creed of all successful engineers. To those of us who have witnessed the tremendous efforts made by the Chinese, in recent years, to develop the natural resources of the country by engineering works, the words are a consolation to-day. During the last few months many who reside in the British colony of Hong Kong, have been almost within earshot of the guns and the bombs that have harassed our neighbours. We have had in this colony swarms of refugees, constant appeals for help for the wounded, and graphic personal descriptions of the destruction that has been a feature of this desolating conflict.

Although the large generating station of the Shanghai Power Co. was one of the few buildings outside the Foreign Settlements that was spared from attack thus ensuring a constant supply for the large Japanese population and factories in the Settlements—yet elsewhere in China power stations and other engineering works have been the objectives of the bombers. The staff of the Shanghai Power Co. were in constant peril for several weeks. Travel from the power station to the International Settlement was by launch and always there was gunfire across the river.

Proposed power house site a mile below the Hu-k'ou Falls on the Yellow River

During this conflict many university buildings in China have been destroyed. A Chinese engineer (an M.Sc. of London) on his way to Tientsin requested me to take care of his technical books. "The Japanese will seize them at the Customs barrier at Tientsin," he said, "and burn them, for they are determined to control all professional work in China and they will permit no technical instruction if they can prevent it." It would be a futile attempt to prevent an intellectual nation, as the Chinese truly are, gaining scientific knowledge. In this era of radio, and the printing press, with many millions of Chinese overseas chained by sentiment to their native land, the effort to stifle a knowledge of technology will merely stimulate an increase in the Chinese efforts to study engineering science.

A 50,000 h.p. Scheme

Among attractive engineering projects, in the minds of a large number of Chinese trained in science, are those connected with hydro-electric power. In the period 1927-37 an immense amount of data concerning China's rivers was collected. A preliminary report on hydro-electric development in the northern province of Shensi was accepted by eminent engineers as providing valuable data. It includes the following interesting statement.

> "A recent writer on power development has placed the potential water power of China at 20,000,000 h.p. Much of this is on the upper Yangtze and inaccessible to localities where it can be used to advantage under present conditions of transport. While the proposed development of Yellow River power on the Shansi-Shensi border is less than 1 per cent. of the total available undeveloped water power of China, it is of great significance because of its availability, being reasonably close to good farm lands that need cheap power for pumping water for irrigation and also convenient for supplying cheap electrical power for industrial development in regions from 60 to 125 miles to the south. As an engineering undertaking this project is considered to rival many large power plants in Europe, Africa, and America. There are special problems arising in the study of the design for the most practicable and efficient development of this power. The occurrence of ice and silt and extreme fluctuations of flow all tend to complicate the problem. Then there is the question of use in a region which heretofore has never used power of this kind or even steam power except in a very limited degree."

The report goes on to anticipate that the benefits of this development would soon be far-reaching and favourably effect the general living conditions and prosperity of the Chinese people in this part of the country. A part of the power would go to increase yields of farm crops on the Hotung Plain and in the Chiangchow and Hotsin districts in the vicinity of the mouth of the Fen Ho, not only greatly decreasing drought losses but also aiding greatly in preventing famine even in districts far removed.

The power would also be used in such industries as the fixation of atmospheric nitrogen, and its many allied chemical industries, within a few years with a marked benefit to the

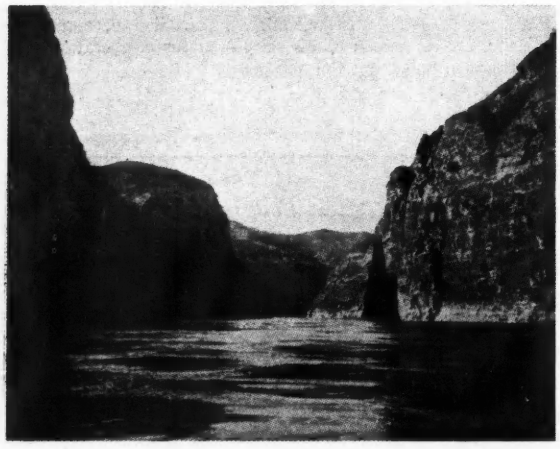
country thus served. Even the petroleum-bearing strata of North-central Shensi may find this power so low-priced as to warrant its use in large quantities.

The statement concludes :—

"Mills for the spinning of cotton yarn are already awaiting the development of this power as also are many municipalities that would use it for lighting purposes. Suitable use may be found for this new power without going far afield. Before many years a greater demand will likely require a further development of the potential power of these falls and the rapids between them and Yumenk'ou."

The Available Flow

Mr. O. J. Todd, working as chief engineer of the China International Famine Commission, made a number of measurements and estimates for this project. There is no greater authority upon the hydraulic problems of North China than this experienced American civil engineer who has devoted the last sixteen years of his life to carrying out valuable hydraulic schemes in China and in accumulating reliable data. The engineers employed by the Famine Commission, over many



Gorges on the Yellow River north of Yumenk'ou, Shansi

years, and the Chinese Government, are convinced of the accuracy of the following figures for assured flow, *viz.*, minimum flow (primary power) 10,000 sec.-ft.; average flow (secondary power) 30,000 sec.-ft. available eight months per year; flood flow, 130,000 sec.-ft. (not all available without storage); maximum flood flow 360,000 sec.-ft. (few days' duration only).

For 50,000 h.p. little over half the low-water flow of the river will be used, the head obtained being 100 ft. The 50,000-h.p. plant will produce 327,748,000 kWh in a "no shut down year" of 365 days running at 24 hours a day. For the first stage of development five units of 10,000 h.p. each are recommended. It is estimated that, with the many opportunities to dispose of this new power, the entire output of the plant will be economically employed within less than five years of the completion of the installation. There are several other smaller projects for utilising water power in this region, details for which have been fully worked out.

The provinces of Shensi and Shansi in North China are rich in minerals and areas devoted to growing cotton, and when Japan became transformed into an industrial nation and was determined to expand her foreign trade she realised their potential wealth and their great possibilities of economic development by the use of applied science. It is pathetic to remember that, during the period when Ewing, Ayrton, Perry and other foreign engineers were introducing technology to Japan, the intellectuals in China, with a knowledge only of their own classics, opposed any Western ideas, and scorned technology. Now, however, the Chinese intellectuals and officials have become enthusiastic advocates of engineering works.

The problems facing the engineer in China are many, but the difficulties that must be solved are much more closely connected with international politics and economics than with technology. The British Economic Mission which visited China a few years ago reported that the great need in that country was to put power behind the worker. The possibilities of developing water-power are greater in China than in many other lands, because the cost of labour is so much less and the volume of the rivers so great. It has been estimated that in Hong Kong big dam construction was accomplished at about one-third of the cost of similar work in England. Hydro-electric power plants usually involve the construction of dams for water storage. China is a land where the farmer is largely dependent upon irrigation.

Inevitable Developments

Whatever the result of this present conflict, engineering developments in China are inevitable in the near future. It is the avowed purpose of the Japanese to introduce mechanisation into the areas they control in order to make full use of the natural resources of the country. They may utilise the water power mentioned in the report quoted above. If they do they will present the Chinese with an object lesson which will be copied in the inland western provinces of China.

The data concerning water power made available by the work of the Chinese Central Government and expert advisers during the last ten years is the foundation upon which will be built, in due course, many interesting hydro-electric schemes, although the present conflict is delaying progress in China. It is, however, some consolation, in these days of anxiety, to remember that "no good work is ever lost." The scientific data, and the technical plans prepared during the last ten years in China will be utilised to the benefit of the nation.

E.D.A. in the Midlands

PROPOSING the toast of "The Association" at the annual dinner of the Central England Area of the British Electrical Development Association at the Queen's Hotel, Birmingham, on Tuesday, Sir Cyril Hurcomb, chairman of the Electricity Commission, declared that all modern businesses were in need, in addition to local development, for some national service such as E.D.A. provided.

In the great work that had been going on it was impossible to ascertain the percentage of increase in use of electricity due to any particular cause. The electricity supply industry was one of the few which had continued its upward trend during the depression. The lowering in price was partly the cause and partly the consequence. In any case the value of E.D.A.'s work could not be denied.

Quoting figures demonstrating the progress which had been made in domestic electrification Sir Cyril said that electric cookers were now installed in over a million homes. Refrigerators were an important item and over a quarter of a million were in use. Enormous strides had recently been made in electric street lighting; some 450 authorities had adopted the new discharge lighting, so contributing to safer road travel.

Ninety-six per cent. of the statutory undertakings had been changed over to the standard system of supply. In 1936-37 the net increase in the number of consumers was 850,000, bringing the total to 8¼ million. Of that number 85 per cent. were domestic. In that year the total sales of electricity amounted to 17,142 million kWh, an increase of 292 million kWh over the preceding year. Since 1920-21 the consumption per head of population had risen from 82 to 374 kWh.

When it was to be remembered that about 38 per cent. of the premises in the country remained to be connected it must be realised that there was still much to be done. Particularly was this true in connection with rural development, for which in many cases there was no alternative to electrical service.

Some supply authorities did not fully realise the value of the traction load, which they stood in danger of losing on account of the tendency to scrap the tramways. In 1936-37 the tramway and trolley-bus load accounted for 565 million kWh.

In a final word on distribution, Sir Cyril said that the only real concern of the supply engineers was that they wished to be assured of continued careers in the industry of their choice.

In reply Mr. A. E. MacKenzie, chairman of the E.D.A. Council, said there was no phase in electrical development in which the work of the Association was not apparent. There were now 444 subscribing members and no fewer than 300 million messages were delivered through Press advertising last year. They were looking forward to still further successes in the training of salesmen.

The motto of Birmingham, "Forward," said the Mayor of Wolverhampton (Councillor R. E. Probert) in proposing the toast of "The City of Birmingham," was particularly apt and had been carried out to the letter. Congratulating the Association on its development work, Councillor Probert said he knew of no business which had as great a scope and had made so much progress as the electrical industry.

Replying, the Lord Mayor of Birmingham (Councillor E. R. Canning) made a strong plea for reduced prices of electricity for agricultural purposes for which, he was confident, there was an enormous demand if only the supply authorities would bear the charges for a few years.

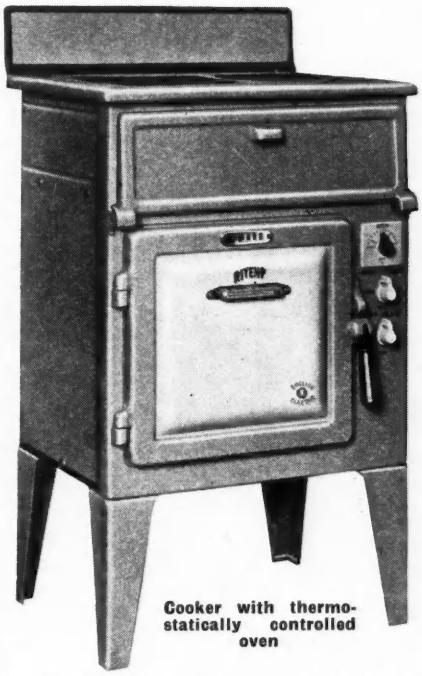
Mr. T. A. G. Margary, borough electrical engineer of Wolverhampton, acted as chairman and welcomed the 130 guests.

Scientific Cooking

By G. F. Sills, M.I.E.E., M.Amer.I.E.E.

A FEW years ago there was little chance of electric cooking being accepted by the Institution of Electrical Engineers as the subject for an important paper. Yet, this session, two papers have been read at headquarters and will be read at most of the local centres. From this we can most certainly deduce that this section of the electrical industry has for some time reached an important status. In its train it brings demands for material such as turbines, boilers, electrical equipment of various kinds, and, best of all, creates considerable employment.

Automatic oven control is making great strides and has come to stay. We live in an automatic age, and the public is "automatic-oven conscious." It enables us to compete effectively with and have a better chance to replace automatic gas ovens, of which there are millions. A good cook can get results with any oven, but anybody can cook with an automatic electric oven by following simple instructions. The gas industry must have spent one million pounds in the last ten years to educate the public in automatic oven control. If a dish is successful it can be reproduced exactly any number of times. Properly cooked food undoubtedly promotes good health, and it is only with precision cooking that the housewife can be assured of this with a minimum of effort.



Cooker with thermostatically controlled oven

With the shortage of maids even an experienced person gains a decided advantage, as extra time can be devoted to household duties, attending to children, shopping, callers at the door and telephoning while the automatic oven takes charge. It gives the housewife additional freedom, inasmuch as once the thermostat is set for the desired temperature, which the user knows from the instructions will be reached in a certain time, that temperature will be maintained as long as desired, and one can visualise many occasions when it must be most inconvenient to put the food in exactly after a specific heating up period. Consumers look to the supply undertaking to give them every possible advantage. At heart we all like to have something modern and save trouble.

Famous cooks have said that "every dish must be cooked for its own exact time and at its own exact temperature." In comparing the thermostatically controlled oven with a standard oven provided with a three-heat switch it should be borne in mind that this type of control gives a definite output in heat units subject, of course, to voltage variation, the British thermal units at medium and low positions usually being one-half or one-quarter of the total output. The user rarely loads the oven during any day with food having the same weight and water content; every cooking operation differs from others in some detail, and even the week-end joint varies in this respect. For instance, the housewife may one day require to cook English meat, and on another frozen meat. Obviously the latter will have a much higher water content and, therefore, the B.th.u.s necessary to cook a meal may vary considerably when using the same oven, and in order to meet these conditions the oven is switched from "full" to "medium" and from "medium" to "low" and back again, should the heat output be inadequate. In effect, for the size of oven used as an example, one has a B.th.u. output of 5,000, 2,500 or 1,250 per hour with three-heat control, whereas the user requires these and other intermediate stages of B.th.u. output for the many and varied cooking operations, and without constant switching and attention it is impossible to attain this result unless one uses automatic control, which ranges from 200 to 550 deg. F. in small steps.

Again, with three-heat control difficulty is often experienced with certain long-period cooking operations due to the necessity to maintain low temperatures accurately throughout the period. With thermostatic control this difficulty is easily overcome. In certain districts this is a specially important point, since it is quite common for the entire household to be away all day at their various duties, and to require a hot meal, such as hot-pot or stew, immediately on their return in the evenings, and it is only with automatic control that this can be accomplished—ensuring an easy mind to the housewife. Furthermore, for high-temperature quick cooking, such as sweet pastry, it is possible to continue cooking batch after batch with the positive assurance that the proper temperature has been maintained.

> ***Both user and supply authority stand to benefit by the employment of automatic oven control***

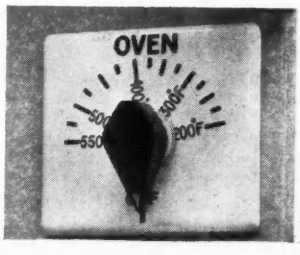
It was once erroneously thought that by taking any oven and placing in it any thermostat the result would be an automatic oven, and this was the type available up to 2½ years ago. To achieve correct results, however, the construction of the body of the oven, the type and location of the elements, the type and position of thermostat, and air circulation must be treated as a whole.

The chief cooker engineer to one of the three largest corporations in a recent "premium" paper said :—

> Having regard to the conditions under which an oven must operate, the effect of cooking food on everything inside the oven, the facility for cleaning, the low time for initial temperature rise in relation to watts density, it would appear that the best is the one detailed in the following paragraphs :—
>
> An oven construction of welded or steel pressings, mottled vitreous enamelled, the opening being coterminous with the door opening on the front frame casting. (Thus avoiding dirt crevices.) Fitted with totally enclosed or channel-type convective elements provided with plug-in pins including earth pin and housed behind rounded pressed-steel runner guards, hinged from the front or fitting on to non-corrosive channels with large bearing surface. An oven of this character is easy for the user to operate and clean, cheap for the supply authority to maintain and recondition.

A series of tests is given for a variety of oven constructions and methods of heating. The comparisons show how favourable is the type suggested in the above paragraph.

Numerous comparative tests with various types of ovens by one of the largest power companies have proved that this construction with its heating by convection gives the most consistent results with closest and most even heat control. In this case the hot air rises from the elements and reaches the thermostat before affecting the oven temperature generally. There is no excessive heat and no overshoot, just the desired heat—no more and no less. It has been found that this oven thermostat has a differential of only plus or minus 4 deg. F.



Thermostat control dial

Another paper was read before E.D.A. by an expert of a large supply authority, who stated that the figure of merit for the oven described above would be 100, and compared this with a figure of 60 to 70 for an oven into which a thermostat had been inserted to call it an "automatic cooker."

Independent tests have shown that one well-known thermostat has a life of twenty-five years, and that it is just as reliable over a long period as the ordinary three-heat switch, if not more so; the thermostat in question was still within plus or minus 2 per cent. It has been found in the north that if the public is given the alternative of automatic control at an extra 1s. per quarter it is only a matter of weeks before the demand is for nothing else. One of the largest authorities, towards the end of last year, decided to follow this, and within a month 80 per cent. of the new consumers took the automatic cooker.

It is suggested that the longer an undertaking delays in giving the consumer automatic ovens the greater is the trouble in store for it when the inevitable change-over comes. It is

felt that in the near future all undertakings will have to make provision for the simple hire of cookers, and everything points to a positive demand for an automatic oven. Even in a distressed part of the country automatic control has made rapid strides, and the people willingly pay 1s. per quarter extra.

In any case, it is essential that cookers sent out nowadays shall be so constructed that they can be changed over to automatic oven control. One maker at least sensed what was to happen, and for twelve months has sent out all non-automatic cookers arranged for easy conversion to thermostatic control on site. A cleaner oven is obtained as one cooks at a lower temperature. Fewer complaints have been received from consumers. Maintenance has been reduced—one reason being that the thermostat will not allow the oven to reach an excessive temperature, resulting in distortion or a burst thermometer if one is fitted.

Radiant-type elements used with automatic control in nearly all cases are fitted behind vitreous enamel shields of sheet metal. This radiant heat impinging on a small section of the area is deleterious to vitreous enamel, and sooner or later maintenance costs are likely to be incurred.

A really clear mercury indicator marked "Slow," "Mod.," "Hot," "V. Hot," should be fixed to the door and calibrated to give the temperature in the centre of the oven. This is much better than a pilot light for the thermostat, as the latter does not indicate if one or more of the elements have burnt out. The thermometer or indicator, as it is in this case, not only gives the cook confidence but is a visible check.

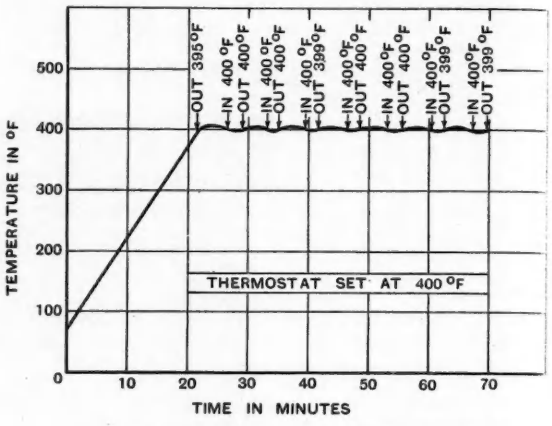
The markings of the thermostat dial should be black on a white background and capable of being read 10 ft. away. This is a most practical point in badly lighted kitchens and sculleries. In the oven in question the indicator follows the thermostat within about 10 deg. The thermostat dial should be marked in deg. F.

It is suggested that it is most important to fix a standard method of thermostat dial indication; in other words, all the people using electric cookers, whether three-heat or automatic, are dealing in degrees Fahrenheit. The Manchester High School for Domestic Science, which trains pupils for the Board of Education Domestic Science Diploma and the E.A.W. Diploma, instructs in deg. F. for electric cooking.

Automatic ovens enable more cookers to be connected up on the same mains as a better diversity factor is obtained. A large undertaking believes that the maximum demand on the system will be reduced, and it is carrying out tests to arrive at a figure. This will be particularly important to those who take a bulk supply.

Mr. Townley recently said that there were too many combinations of heating available in an electric oven, and instanced the difficulty experienced by people removing from one district to another in not being able to get equally good results—with consequent complaints. A closely controlled automatic oven will overcome this. A good thermostat removes complaints of voltage variation since, once the required temperature is obtained, should the voltage fall it only means that the thermostat will in the meantime work less frequently to maintain this temperature.

It is not claimed that with thermostatic control fewer kWh are used, although it can be assumed that the consumption is slightly less. With thermostatic control the oven loading can



Oven heat with thermostat set at 400 deg. F.

be increased, thus cutting down the pre-heating time and yet using no more electricity. The most robust, reliable and accurate thermostat has been found to be of the rod type. Close automatic control ensures better cooking, since the food is not subjected to sudden temperature variations.

It will usually be found that those who state that automatic control is not necessary have not had experience with it. It seems to me a fair statement that automatic oven control is the premier point in electric cooking. The use of the oven is the most uncertain operation in cooking; it seems fair, therefore, to give consumers the easy solution of first-class automatic oven control.

Asymmetric-sideband Broadcasting

PRESENT methods of working permit few, except local, radio broadcasting stations to be received without interference from other transmitters operating in contiguous frequency channels, unless the upper frequencies of modulation of the wanted station are severely attenuated, which causes the reproduction to lack intelligibility and naturalness. This state of affairs can be mitigated without introducing audible harmonic distortion by utilising the asymmetric-sideband system of transmission to cut away, with the aid of electrical filter circuits, part of one sideband of the frequency spectrum radiated.

The principle was surveyed by Mr. P. P. Eckersley in an I.E.E. paper in 1935. The same author's supplemental paper which was read before the Wireless Section of the Institution of Electrical Engineers in London on March 2nd contains the results of a quantitative study of the subject which is intended to form a guide to practical design.

The author shows how asymmetry, either of phase or of magnitude, between two sideband components, created by any given modulation component, is related to harmonic distortion; and that this distortion is proportional, over a large range of values, to depth of modulation. The nature of the sound spectrum is such that the intensities in the upper register are much less than those in the lower middle register. Since the degree of asymmetry between counterpart sideband components is a measure of the attenuation of the cut-away sideband, this attenuation can be increased as the modulation frequency is made greater. This is tantamount to saying that, as the sideband frequency becomes more and more removed from the carrier frequency, it may be more and more attenuated while the distortion can be made to remain constant and small.

Curves are derived which show the required attenuation-constant of filters which cut away part of one sideband, but produce no more than a constant distortion. Phase asymmetry between counterpart sidebands may give rise to more serious distortions than are created by magnitude asymmetry acting alone, and a network is described which keeps phase asymmetry to the minimum and yet gives a close approximation to the required attenuation.

A highly trained ear may, on rare occasions, be able to detect some slight differences between the two types of reproduction, when they are directly compared, but the general public would be quite incapable of so doing even if they possessed receiving apparatus so free from distortion itself as to give them an opportunity to do so. The author suggests that it is better to face the occasional minute deteriorations in quality given by the asymmetric system than to suffer from the continuous hissing and spitting sounds brought about by existing inter-station interference.

The asymmetric system has three possible applications to space broadcasting as it is practised to-day. (1) It could be used to allow carrier difference frequencies of the order of 11-12 kc without introducing any sideband overlap interference. (2) It could be applied to existing conditions, where carrier difference frequencies are of the order of 9 kc, and would reduce inter-station interference to the order of one-tenth its present value. (3) If existing interferences are considered to be tolerable, then carrier difference frequencies could be reduced to 6 kc without increasing interference above its existing values; this implies that 1½ times the number of stations working in Europe to-day on exclusive waves could be accommodated in the existing wave-band.

It is suggested, finally, that a policy could be adopted such that the introduction of the asymmetric system would encourage receiver development along lines wherein, by an augmentation of only the carrier component at the detector, all distortion due to the use of an asymmetric spectrum would be eliminated. Thus an evolution might be envisaged which led to the introduction of the ideal carrier and single-sideband type of transmission when all receivers were adapted to reduce the resulting distortion to a tolerable amount.

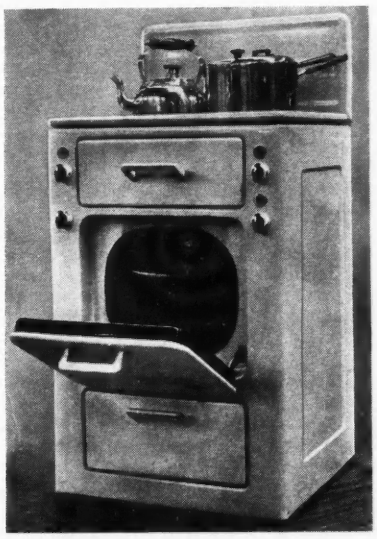
The British Broadcasting Corporation provided funds for the construction of the author's test apparatus and the Countess Von Zeppelin evolved a mathematical expression of the distortion component.

Last Days at the Fair

The electrical functions and a final review of the exhibits

AMONG the electrical functions during the concluding week of the British Industries Fair which closes to-day (Friday) have been gatherings of the E.P.E.A. and E.A.W. and several other electrical organisations.

A plea for a new conception of industry was made by Mr. J. N. Waite, city electrical engineer and general manager of Hull, at a luncheon held last Saturday when members of the E.P.E.A. and the E.A.W. Demonstrators' Circle paid their official visit to the Fair. In the past, he said, producers believed in free competition and that prices should be allowed to regulate themselves. Competition was, however, essentially wasteful and price regulation had become necessary. As a result, competition in many large industries had been abolished. It was now realised how much more could be done with industry properly organised.



This Rubery Owen cooker with cylindrical oven (described in our last week's issue) has been one of the outstanding attractions of the Fair

[Elec. Rev. photo.

So far the rise in the standard of living had been accidental, incidental and complementary. We must now realise that the object of industry was human happiness. Obviously a reasonable rate of profit must be provided for, but profit extended too far became a vice. The real aim of industry should be to give service. This fact had been realised in the electrical industry for some years. With this reversal of motives service became the primary and profit the secondary consideration, and he saw no reason why industry with this motive should be less fruitful.

Speaking of the work done by the E.P.E.A., Mr. Waite said that the Association was making sure that it would give first-class service to the industry and was rendering it possible to reduce the price of electricity and so extend its use. Personally, he regarded the potentialities of electricity in the domestic field as far greater than in the industrial. To-day electricity was one of the few things cheaper than before the war, and its price showed no sign of increase. By passing on the knowledge of the advantages of electricity to all, the Electrical Association for Women was performing a most useful and altruistic service and its influence was extremely valuable to engineers.

Welcoming the guests on behalf of the Birmingham Chamber of Commerce and the Fair Management Committee, Mr. T. J. Kennedy, past-president of the Chamber of Commerce, congratulated the electrical industry on its assistance in making the Fair a success, and hoped that the time was not far distant when the whole of the industry would be represented.

In response, Mr. L. Hoskison, president of the E.P.E.A., said that the members of his Association appreciated the fact that they should prepare themselves to give service and that the changed outlook referred to by Mr. Waite would have a far-reaching effect on the members of the industry. They believed that no industry could be successful unless the people engaged in it were happy, and he was proud to say that on the whole they were happy.

Miss Milner, chairman of the E.A.W. Midland Demonstrators' Circle, thanked Mr. Kennedy on behalf of the E.A.W.

The valuable work done by the recently formed Central England Federation of the Electrical Association for Women in bringing the local branches in closer touch with each other and with headquarters and in enabling the stronger branches to help the weaker was stressed by Mrs. F. Forrest at a tea held on Thursday last week on the occasion of the official visit of the Birmingham and District Branch to Castle Bromwich. This work, she said, was especially important on account of the inevitable fact that due to distance, time and expense it was impracticable for many provincial members to serve on the Executive Council.

Members of the the Students' Section of the South Midland Centre of the Institution of Electrical Engineers visited the Fair on Saturday and were entertained to tea by the Fair Management Committee and the Birmingham Chamber of Commerce.

Progress in the Electrical Industry

A tribute to the progress made by the electrical industry was paid by the Rt. Hon. E. Leslie Burgin, Minister of Transport, when proposing the toast of "Industry" at the third electrical luncheon held last Tuesday on the occasion of the official visits to the Fair of ten associations connected with the electricity supply, electrical manufacturing, wholesaling and contracting industries.

After congratulating exhibitors on the improvement in the layout of their stands, Dr. Burgin said that if anyone after a walk through the Electrical Section had any doubts as to the immensity and virility of the industry, he should remember that it represented an investment of over £600 million and employed some 300,000 people.

Speaking of generation, Dr. Burgin stated that few would contend that the initial conception of the grid scheme had not been justified both technically and economically. Of the national output which last year reached 22,900 million kWh, the 150 generating stations connected to the grid were responsible for some 95 per cent., about half of which was generated by about fifteen selected stations. Only eleven years ago, in 1926, the production of a little more than 7,000 million kWh was spread over 480 stations. The C.E.B. was now about midway through the initial tariff decade in most of the scheme areas. The full financial benefits of this concentration could not be ascertained until the tariff periods were ended; but the economies effected by the reduction of idle plant, increased overall thermal efficiency and reduced fuel consumption per kWh generated were yielding substantial annual savings. The economies due to improvements in design and operation of steam raising plant following the concentration of generation in the more efficient stations were reflected in the fact that in 1920-21 the average fuel consumption per kWh generated was 3.42 lb. and in 1936-37 that figure had fallen to 1.47 lb.

In response, Dr. A. H. Railing said that they had every reason to be satisfied with the progress made during the past few years—progress due to the common sense and co-operation between employers and employés and between the various industries and also to the support from the Government. The Government was to be congratulated on the success of the grid scheme and they welcomed its control, the object of which was to spread the use of electricity to the greatest possible extent. There was a definite need for the proposed new legislation for the reorganisation of electrical distribution.

A 2-kW reflector fire (Thos. Winston)

[Elec. Rev. photo.

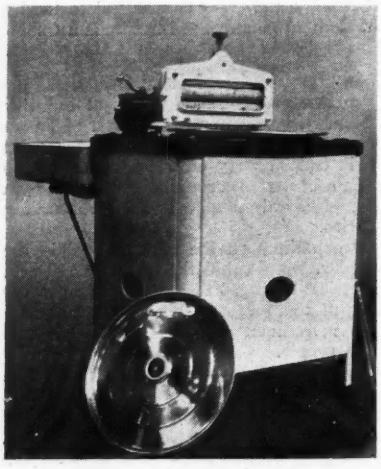
Among those present at the lunch were:—Sir Cyril Hurcomb, Sir Archibald Page, Sir Duncan Watson, Lord Strabolgi, Sir Percival Bower, Ald. H. J. Sayer, Ald. A. Walker, and Messrs. F. Hodges, W. J. Bache, V. Watlington, C. G. Morley New, H. Nimmo, H. T. Young, J. M. Kennedy, L. Browett, Harold Hobson, W. B. Woodhouse, J. M. Donaldson, A. B. Wildsmith, Johnstone Wright, H. E. Walker, A. E. McKenzie, H. M. Fulton, F. W. Smith, F. Forrest, A. P. Edgcumbe, C. W. Sully, R. T. G. French, A. C. Cramb, V. W. Dale, A. Albrecht, T. A. G. Margary, E. E. Hoadley, J. T. H. Legge, R. T. G. Guest, L. C. Penwill, H. Drake and T. R. Martin.

Further Exhibits

Every year at the British Industries Fair there are a few developments which are not ready for display during the first few days. Several such items have made their appearance since last week so that to-day we are able to give a last-minute description of these as well as other electrical ex-

hibits which we have discovered on stands outside the Electrical Section.

To join the new cabinet model washer on the British Electric Domestic Appliances' stand has come the first factory model of an upright type cleaner which will soon be in full production. This is the company's first attempt at an upright model, and its low price and strong suction alone would appear to ensure its success. A revolving brush facilitates the taking up of threads, &c., and the 1-ft. nozzle is readily adjustable (by means of a handy thumb screw) for different thicknesses of carpet. The dust bag is attached direct to the main casting and can be instantly removed. Three swivel wheels permit easy movement from place to place and a heavy rubber guard obviates damage to furniture, &c. A neat sliding switch controls the motor, which is rated at 220 W. Black enamel and stainless steel give the machine a distinctive appearance.



The "Bar-Spot" washer (Barker & Turner, Ltd.) [*Elec. Rev. photo.*

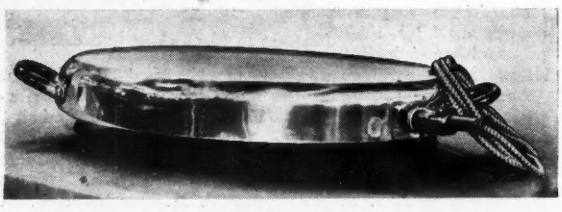
A cross between a solid and radiant hot-plate which does not require any special utensils has been causing a little excitement on the Jackson stand. It glows a bright red and the company's representatives are finding it difficult to convince visitors that no transformer is required. It is just as easily kept clean as the normal solid plate and is being made with either three or four heats. A full technical description will appear in an early issue.

Two new fires caught our eye on the stand of Thos. Winston, Ltd. A wave-like pattern on the reflector adds a sparkling effect to a graceful 2-kW parabolic reflector fire, which is supplied in standard finishes of bronze, silver or chromium. If desired, an illuminated panel containing a tubular lamp can be incorporated in the front, a similar panel being a feature of a new screen fire available with loads of 1 or 2 kW. This model has a substantial pressed body with a cast top and is obtainable in a variety of shaded pastel finishes.

Specially designed long-life and non-sag elements are a feature of the "Solux" electric fires, a new development of Whyte & Collins. Cast-iron frames are used in all the six models available, the whole of the apparatus being of extremely robust design. No fewer than 20 vitreous enamel or synthetic enamel finishes are available, including several especially attractive mottled effects. One-screw fixing is provided on all inset models, the interior casing of which is of all-welded construction.

While on the subject of fires, we regret that the new Berry surround with the colour changing floodlighting was described in our last week's issue as the "Camellia" instead of "Chameleon," as given in our guide the week before.

A new arrival on the Hague & MacKenzie stand is an aluminium plate warmer loaded at 150 W. This "Pyramid" product is oval in shape, its overall dimensions being about 20 in. by 12 in. by 3 in. The same company has also just brought out a combined car heater and inspection lamp made of anodised aluminium. It takes a 60-W lamp, which is covered by a shield when being used as a heater. A hook is provided at one end for hanging.



A Hague & McKenzie plate warmer [*Elec. Rev. photo.*

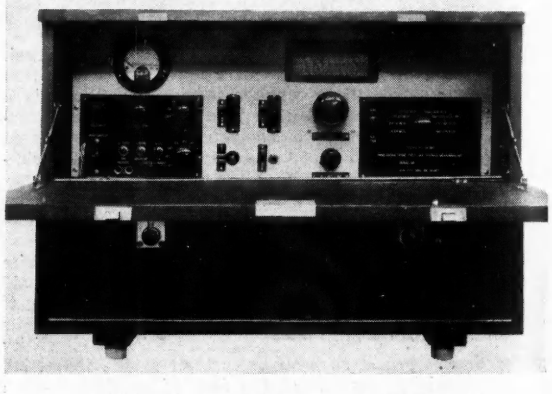
Except in recently built houses, obviously no one is ever intended to enjoy that luxury—reading in bed. This year, however, manufacturers are apparently out to rectify this defect. Both Knightshades, Ltd., and Robbins & Bradley have bed-head and bedside lamps of various dainty designs, and, to avoid groping for switches in the dark, Taylor, Law & Co. have incorporated in their "Tala Touchlite" a switch in the form of an oval plate measuring about 4 in. by 3 in. This lamp is obtainable in any colour with parchment shades either plain or with floral design. It can be stood on a table or hung (by means of slots) on to the wall.

Something new in nursery lights is to be found in the "Alicia" fitting, which Wilcox & Pitman have produced as a result of an idea originating from one of their directors only three weeks ago. Separate holders at the top and bottom of a circular metal framework suspended vertically from the ceiling contain, respectively, 15-W and 60-W lamps, both of which are hidden from view by an attractive inverted bowl shade. Changing over from one lamp to the other is effected by means of a pear switch suspended from the fitting.

Illuminated mirrors seem to have come into their own this year, and any number are to be seen, particularly among the exhibits of the Building Section. We particularly like the new hexagonal and oval shaped table models shown for the first time by Charles Hufton & Sons, Ltd. In these the illumination comes from 15-W lamps concealed behind circular or quadrilateral apertures in the bottom of the mirrors, some of which have bevelled patterned edges. Their modernistic stands are made of chromium-plated brass. Several types, with fancy mirror designs, are also made for wall use, both with concealed lamps and with lights above.

A number of improvements are noticeable in the Metlex bathroom mirrors, the anti-dazzle light from which comes from the borders. L. G. Hawkins & Co. are now marketing a special shaving mirror with a light above and an interlocked switch socket for an electric razor.

It may be recalled that at last year's Fair the Coventry Refrigerator Co., Ltd., caused something of a sensation by announcing the production of a 3-cu.-ft. model refrigerator priced at the low figure of 22 gns. An inset model was listed at even less—16 gns. Since then the machines have been further improved and are now of all-steel construction, the prices remaining unchanged. The company also has a range of ice-cream conservators from 26 gns. upwards.



Belling & Lee interference measuring set

Much interest is being taken this year in electric home laundry apparatus, and manufacturers are happy in the knowledge that the public is at last becoming "electrical wash-minded." A considerable amount of new equipment has made its appearance this year, a noticeable tendency being the development of cabinet models in which the wringer is folded up out of sight either in the top or in a special compartment at the bottom.

Most of these we have already dealt with, but the new "Bar-Spot" machine made by Barker & Turner, Ltd., was not noticed last week. Probably the most outstanding feature of this washer is that, contrary to usual practice, the agitator is fixed, the tub itself having a strong reciprocating action. The advantages claimed for this arrangement are that the clothes are unable to get tangled round the agitator and also that the tub, in fact the whole working unit, can be easily lifted out for cleaning or servicing. Seven to eight pounds of clothes can be washed in three or four minutes, and a stoutly constructed wringer, which closes away completely out of sight when not in use, has a strong action and quick release. The lid which covers right over the top of the machine forms a rinsing bath when opened up. If desired, six 500-W Bray "Chromalox" elements (separately replaceable) can be incorporated to heat the water.

The finished appearance of an article, domestic or industrial, plays a big part in its sale. For this reason it is not sur-

(*Continued on page* 316.)

Some of the Stands at the B.I.F., Birmingham

1. British Thomson-Houston Co. 2. Westinghouse Brake & Signal Co. 3. Hotpoint Electric Appliance Co. 4. Jas. Neill & Co. (Sheffield). 5. Electrical Development Association. 6. Birmingham Electric Furnaces. 7. M.C.L. & Repetition. 8. British Trane Co. 9. Geo. Bray & Co.

Meetings and Discussions

The reading of the three-part paper on the Galloway hydro-electric scheme brought forth some interesting points from a number of speakers at the Institution of Civil Engineers last week. The contributors to the discussion on the papers by Drs. W. M. Thornton and E. H. Rayner at the I.E.E. on February 24th included a number of medical men who spoke on the nature of anæsthetics and the degree of ease of ignition by electrical means. At last Friday's meeting of the Institution of Mechanical Engineers two papers on steam turbine design were read; one showed the effects of blade spacing and the other dealt with nozzles.

Water-power in Galloway

Cheap Water Power
Anaesthetic Risks
Steam Turbine Design

A CINEMATOGRAPH film and lantern slides illustrated the three papers (to which reference was made last week) on the Galloway hydro-electric power scheme which were discussed at the INSTITUTION OF CIVIL ENGINEERS in London on February 22nd.

Mr. S. B. Donkin (president) said that he had been responsible for the coupling of the water power stations to the national grid system. The scheme was made economically possible only by its use for peak load purposes in conjunction with the national grid.

It should be admitted that the operating costs of a peak load station could be allowed to be higher than those of an ordinary station, provided the capital charges were comparatively lower. Troubles which had occurred due to snow and frost were confined to the 11-kV lines belonging to the Galloway Power Co. The lines put up by the Central Electricity Board had not suffered in the same way.

Regarding the overall cost of the whole development as now in service of £28.3 per kW of power available, he said that the power was not only available but was slightly more than the output of the installed plant. That enabled a station, or group, of that kind to be worked up to the installed capacity, bearing in mind that it was working only at about 20 per cent. load factor, the diversity of load factor being between summer and winter. It was perfectly true that the total generating costs were less than would be possible with standard steam generating stations. But it was fair to add that a specially constructed steam generating peak load station could compete and could show even lower costs than those of the Galloway stations.

Finally, he applauded the statement in Mr. R. W. Mountain's paper that it would be most interesting to make a new examination of the water power resources of Great Britain in order to compare the total costs of generation in hydro-electric and steam generating developments, bearing in mind that fuel and labour costs were increasing year by year.

Lord Meston paid a tribute on behalf of the directorate of the Galloway Power Co. to the skill, resource, patience and courage of the engineers who had contributed to the construction and completion of the scheme. They had carried out the work without in any appreciable degree affecting or afflicting the amenities of a beautiful and unspoiled part of the country, which had been enriched by a whole series of new lakes.

Mr. H. Hobson (Central Electricity Board) said that economic considerations had dictated that the works should be designed for peak-load operation. In a sense, however, that was hardly true of the Galloway scheme, because it occupied a position in the scheme of things about half-way between base load stations and the real peak load plant required for operation only during a few hours of the day and a few months of the year. It was true that peak load was an important factor and that to provide for it economically was a problem which was constantly before those responsible for the economic production of electricity, but he did not altogether share the opinion expressed by Mr. W. Hawthorne and Mr. F. H. Williams that an increase in the intensity of the peak was likely to follow from more intensive development of the domestic load in an undertaking covering a very large area. It might be true of a small undertaking, but, in considering a large part of the country, or, indeed, the country as a whole, he believed the development of domestic load was quite as likely to fill in the valleys as to increase the peaks.

Economy demanded primarily low capital cost for peak load plant, but it did not necessarily require high efficiency or low fuel consumption. The greater part of the peak load in this country was being dealt with by the older and less efficient existing generating stations, and for the most part he believed it would continue to be dealt with by those stations, reconstructed as might be necessary. The Galloway scheme had not inherently low capital cost, which was about twice that of ordinary steam peak load generating plant. On the other hand, its operating costs were exceptionally low. It would not be economic at very low load factors, but it was economic at 20 per cent. load factor, for which it was designed.

Interdependence with the Grid

Although the scheme had been made possible by reason of the fact that the grid lines were available, the reverse was equally true; it would not have been commercially practicable to construct that section of the grid which was required to connect the industrial areas of central Scotland with those in Lancashire had it not been for the Galloway scheme, which provided a paying load to transmit over the grid. Incidentally, the scheme had made possible the very extensive development of rural supply in Kirkcudbright and Dumfries.

Before the scheme was adopted it was considered very fully by the Central Electricity Board in comparison with the alternative of extending steam generating stations in the neighbouring industrial area, and representations of a very strong nature were made to the Board by the coal mining interests in those areas which had held that on balance the advantage lay

Last Days at the Fair. (*Continued from page 314*)

prising that visitors have this year seemed to be paying great attention to the various displays of paints, enamels, &c., and also to the equipment for applying them. Incidentally, Colour Sprays, Ltd., one of the companies making the latter, have recently developed a special long gun for spraying oil into transformers.

The use of vitreous enamel finish is a new device adopted by the Cardiff Engineering & Foundry Co. for rendering its traffic signs self-cleaning. Complete islands with interchangeable illuminated bollards are another recent development of the company, which, like Preston & Thomas, Ltd. (who are showing examples of electric motors, centrifugal fans, grinders, bottle washers and potato peelers), contributes a portion of the Cardiff Corporation's display.

Though it has been on the market for some time, the "Argson" electric invalid carriage is seen for the first time at the Fair on the stand of the Stanley Engineering Co., Ltd., and incorporates several minor improvements made recently. It can be driven with one hand and will climb a 1 in 4 gradient on grass. Four forward and two reverse speeds are provided, there also being two brake positions.

An excellent opportunity of inspecting the model B.20 battery vehicle (Midland Vehicles, Ltd.) in detail is afforded by the sectioned body, built by the manufacturers in their own works. The near side, being a bare chassis, shows most clearly the attention which has been paid to detail work. The batteries are mounted on withdrawable sub-frames which run on rollers. To facilitate handling, the 36 cells are divided into four crates, two on each side of the chassis. Each of these crates contains a different make of battery, viz., Britannia, Exide, D.P. Kathanode and Tudor. The sectioned body and floor show how the batteries can be withdrawn for servicing, or interchanging of battery units, without disturbing goods in the van. The vehicle is for loads of one ton.

Belling & Lee, Ltd., who specialise in devices for the suppression of electrical interference with radio communication, have manufactured to the design of the Post Office Engineering Department, Dollis Hill, an all-wave radio field strength and noise measuring set. The outfit has a continuous range of from 12 to 2,000 metres and is self-contained in a cabinet measuring 25 in. by 16 in. by 14 in.

Loop and vertical aerials, telephones, calibration charts, batteries and any additional apparatus are contained in the lower compartment, the set being contained in the upper. A superheterodyne circuit is employed with a single tuned signal frequency circuit, heptode frequency changer, separate triode oscillator, four intermediate frequency amplifying stages at 450 kc. p.s., combined diode rectifier and triode d.c. amplifier in the anode circuit of which the indicating meter is connected, and an intermediate frequency oscillator which is employed only for the reception of c.w. signals. The output indicator complies with the requirements of the C.I.S.P.R. for the measurement of noise. Attenuators, calibrated in db. steps, are provided in the intermediate frequency amplifier. The uses of the measuring set include the measurement of radio frequency noise voltages, the measurement of radio frequency and noise field strengths, reception of c.w., i.c.w. and telephony with and without automatic gain control, and approximate direction finding with the screened and balanced loops.

with coal-fired steam stations rather than with the hydro-electric. It would seem that the margin was not a very large one at that time in favour of the Galloway scheme, but the recent action of the coal owners, with the able assistance of the Government, had certainly proved the coal owner's arguments to be unsound, for the price of coal in central Scotland had increased by 48 per cent., and in North-West England by 22 per cent. since the original estimates were made in 1932. There could be no doubt at all to-day that the hydro-electric scheme was thoroughly sound, as compared with coal-fired steam production.

He expressed appreciation of the valuable co-operation of the Galloway Co.'s staff in carrying out the somewhat complex operations which were necessary to meet the rapidly varying load requirements of the two areas served.

Mr. James Williamson, who had been associated with the scheme since its inception in 1923, said that an extraordinary fact arising from comparison of the two methods of development was that for continuous load the cost would be about £65 per kW, but that expansion of capacity for 50 per cent. load factor could be obtained at £9 per kW; the indications were that any further expansion of capacity for lower load factors would be obtained at less than £9 per kW. So that while such a scheme could not compete with steam stations for continuous load, a point was reached eventually at which active competition between such a scheme and steam generation did arise.

One of the remarkable features of the scheme was that when it was completed it was turned over immediately to practically full load (99,000 kW), the installed capacity being 100,000 kW. It was astonishing that the Galloway scheme, which was the last of the three large water power schemes in Scotland to be commenced, was the only one which had yet been completed.

Mr. W. Hawthorne, in a brief reply to the discussion, said that great credit was due to the Central Board for its courage in backing the new scheme when it would have been so much easier to have continued in the old way, with a steam set here and another there, than to embark on a scheme which was untried.

Danger From Anaesthetic Explosions

THE two papers, to which reference was made last week, in which Dr. W. M. Thornton and Dr. E. H. Rayner dealt with the risk of explosion in hospital operating theatres due to possible electrical ignition of anæsthetic vapours, were discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 24th.

Mr. H. W. Swann (Home Office) said it was just as well that this matter was not often discussed. So long as the risk was appreciated in the proper quarters, that was really sufficient. In 1935 the Ministry of Health began to feel some anxiety over the number of explosions of this nature which were taking place, not so much in this country (where there was great freedom from them) as in other countries where the climate was different. The Home Office could obtain particulars from various sources of only twenty-three explosions which had taken place in recent years, but there were probably a good many more. Of the twenty-three cases fourteen were fatal and seven involved injury.

At the instance of the Ministry of Health he visited a number of hospitals and had been brought into touch with the Medical Research Council, and particularly with the Anæsthetics Committee, and through the efforts of Dr. C. C. Paterson and Mr. E. B. Wedmore and others research was started. The temperature of the glass bulbs of the little surgical lamps used in nose and throat operations, which were commonly overrun in order to give the greatest possible amount of light, could be dangerous having regard to the lower limit of inflammability of ether-oxygen mixtures. His own personal contribution to this work had been confined to persuading others to do it, with the single exception of attempting to devise, unsuccessfully, apparatus after the manner of a vacuum cleaner for extracting the gas as soon as the patient had finished with it, so that the risk of explosion would be reduced. Unfortunately, the only device (arrived at with the assistance of the General Electric Co.) that gave a desirable result created too much noise.

Conducting Rubber

If a flexible was on the point of parting just before the last strand broke it might become incandescent and in itself might cause an explosion or ignition, although the circuit remained intrinsically sound so far as the spark energy was concerned. That made it imperative that voltage and resistance should be related, *i.e.*, that a 2-V lamp should not be used on a 6-V circuit.

The conducting rubber which had been demonstrated that evening seemed to have jumped into people's minds rather suddenly. The London Passenger Transport Board was using it for tyres on trolley buses, and the implication was obvious. A specific resistance of the order of 100,000 ohms would be quite sufficient to disperse a static charge and yet it would not be sufficiently conducting to introduce the risk of fire, which was quite a real one because there were other things than statics in an operating theatre. For these reasons it was imperative that this class of rubber should be graded and also produced to a specification.

In conclusion, Mr. Swann said these papers showed the necessity for setting up a joint body consisting of surgeons and anæsthetists on the one hand and electrical engineers on the other, which would be able to produce some arrangements for controlling the design of electro-medical apparatus.

Effect of Air Conditioning

Dr. C. F. Hadfield said he had always taught medical students that static electricity was not a great danger in a climate like ours, but apparently he was wrong. This seemed to be due to air conditioning, which added to the risk of shock. While our authorities had been spending money in drying the air, the Americans had been busy devising humidifiers for maintaining adequate moisture in the air. All the major anæsthetic agents were inflammable and explosive or, at least, supported combustion, and there was a wonderful field for an anæsthetic gas equally potent as ethylene or cyclopropane, but which was not inflammable, although he thought it highly improbable that such a discovery would be made.

Dr. D. T. A. Townend said that in the Fuel Technology Department at South Kensington they had studied ether combustion from a different aspect. In particular, it gave rise to that peculiar type of combustion which was referred to as the "cool flame," which (he demonstrated) preceded the full flame in explosions of these mixtures and indicated how this research had a bearing on what happened in the case of ether-oxygen and other explosions in the operating theatre of a hospital. The cool flame was only very faintly luminous and so might have escaped Dr. Thornton's notice.

Mr. C. T. A. Harper gave the results of some experiments on the effect of increasing the temperature of the small lamps used in surgical operations and after showing by means of lantern slides how these temperatures could easily reach a dangerous degree suggested that it should be made impossible for surgeons to overrun the lamps.

Dr. H. L. Saunders gave a description of apparatus he had used to check some of the figures in Prof. Thornton's paper with regard to fizzling sparks and said that under certain conditions of temperature a single strand of a 14/36 flex could have its temperature raised locally to ignition point, although the same mixture would not be exploded by general sparks from the same flex. It was a combination of heating effect and spark which was the most insidious form of risk. As a means of testing flex from time to time it was possible to apply a known voltage and measure the current, especially when the flex was held under tension. Any alteration in the resistance would clearly indicate that something was wrong in the circuit. Speaking of surgical lamps, he said the ignition temperature of an air-oxygen mixture was of the order of only 180 deg. C., and he had heard that the temperature of the glass bulbs could exceed that. He did not think that it should be beyond the capacity of the lamp makers possibly to vacuum-jacket the lamps and so cut down the outside temperature.

Limitation of Lamp Current

Prof. S. Russ said he had tried deliberately to obtain explosions by raising the temperature of surgical lamps but had failed. The ordinary current taken by these lamps was quite inadequate to create an explosion and limitation of the maximum current could be an important factor as regards safety. He suggested that an Operating Theatre Safety Committee should be formed to draw up recommendations for general use to obviate the use of dangerous circuits of all kinds in operating theatres.

Dr. C. Langton Hewer, after emphasising the danger from the overheating of lamps, said that a point not yet mentioned was the temperature at which ether vapour, when contaminated, would ignite. Although the lowest temperature was given as about 180 deg. C., when contaminated with peroxides it would ignite at as low a temperature as 100 deg. C. Practically all these vapours had a greater density than air and sank toward the floor and ignition could occur quite long distances from the source. There was thus also great danger from foot switches and spark gap interrupters.

Mr. F. C. Raphael asked if switches in iron boxes, either on the surface of the wall or sunk in the wall, with covers that were not gas-tight, could be regarded as safe, either in the operating room or in adjoining rooms, such as the surgeon's dressing room or the sterilising room. In a new operating theatre it was possible to install at the outset sparkless switches and make everything safe, but to have to do

this in an existing hospital would involve considerable expense.

What was the dangerous limit with a.c., such as the secondaries of headlight transformers? Could it be taken that below 30 V there was no danger, if the wattage was limited to 70 and the inductance of the circuit was not abnormally high? The paper referred only to the secondary circuit of the step-down transformer.

There had been two comparatively recent cases of explosion in London hospitals in neither of which was the cause of ignition discovered, and in one of them every precaution mentioned in the Ministry of Health Circular had been taken.

Mr. E. L. B. Damant urged the need for steps to be taken that would enable manufacturers of electro-medical equipment to send out their apparatus with a guarantee of safety when used in an explosive atmosphere. The standardisation of small surgical lamps should also be considered.

Prof. W. M. Thornton said there was every possibility of that meeting beginning a new phase in connection with electricity in hospitals. He could not help thinking that it was largely a problem for the chemist. The electrical man had carried his apparatus as far as possible, except, perhaps, with regard to lamps, and it was now for the chemist to discover the best anæsthetic to use. A heavy vapour falling to the floor level diffused as it went and it would require to be of considerable volume at floor level for it to remain an explosive mixture.

Dr. Rayner, in a brief reply, said there had been definite cases of foot switches causing ignition of ether-oxygen mixtures. Ether had a very high molecular weight and "simply poured downhill." Ethylene would not have the same effect. His own view was that wall switches 3 ft. or 4 ft. above floor level were not likely to cause explosions and that the real risk was at floor level. If the vapour was strong enough to explode at any height above the floor the whole of the operating staff would be anæsthetised before the explosion took place!

Turbine Blades and Nozzles

TWO papers presented at the February 25th meeting in London of the Steam Group of the INSTITUTION OF MECHANICAL ENGINEERS contain accounts of investigations relating to steam turbines.

In one of them Mr. R. Dowson (C. A. Parsons & Co., Ltd.) describes experiments made with low-velocity reaction blading to show how the torque on each blade is influenced by the presence of the other blades. The results indicate that the effect of circumferential spacing on maximum torque is fairly critical, and that from the optimum point the torque declines less rapidly with increasing spacing than with decreasing spacing.

The decline in torque with increasing spacing is due probably to lack of proper guidance of the steam, only a portion of which gives up energy to the runner blades, the remainder doing little useful work. On the other hand, the force *per blade* increases with increasing circumferential pitch toward some optimum value (beyond the range of the experiments). No definite conclusion is possible without further investigation.

The second paper, by Messrs. A. M. Binnie and M. W. Woods (Oxford University Engineering Laboratory), describes the pressure distribution in a convergent-divergent steam nozzle. They found that in its passage through the nozzle, initially superheated steam expanded continuously until condensation commenced, when a sharp rise of pressure (of the order of 1 lb. per sq. in.) occurred. Up to this point the observations were consistent with the predictions of Callendar's equation for the isentropic expansion of superheated and supersaturated steam: the friction loss was small as far as the throat of the nozzle, but in the divergent portion it was of appreciable magnitude.

The Wilson line was determined and the pressure rise was also investigated in detail, being accompanied by a decrease of velocity and an increase of total heat. At the peak of the rise, where continuous expansion recommenced, the steam was probably not in thermal equilibrium. Taylor's theory is more accurate in the neighbourhood of the throat than the classical theory of Reynolds.

Engineering Publicity.—Planned publicity for engineering products is the subject of a paper by Mr. F. Rowlinson which was read before the MANCHESTER ASSOCIATION OF ENGINEERS on February 25th. The author advocates the substitution of properly directed sales promotion for perfunctory advertising. He places definite stress upon the necessity for the specialised Press, as opposed to the national Press, in all technical advertising. The market for engineering products, being specialised, is a limited one and can best be reached through its own papers.

Electricity Supply in the London Area

EACH year the London and Home Counties Joint Electricity Authority publishes a "General Review of Statistics" relating to the electricity supply undertakings in its district. That issued this week is the eleventh of the series and covers the year ended March 31st, 1937, for local authorities and December 31st, 1936, for companies.

The district, 1,841 sq. miles, with a population of 9,088,000 (1931 Census), stretches from Hertford and St. Albans to Dorking and Reigate and from Windsor to Gravesend. It includes the areas of eighty-one undertakings, which are shown in different colours on a folding map. Of these, 16 are Metropolitan boroughs, 28 extra-London municipalities, 14 London and 22 extra-London companies, and the J.E.A. itself. In the following summary the figures in parentheses relate to the preceding year.

There were 54 generating stations in operation with an aggregate plant capacity of 2,367,000 (2,264,000) kW, but the number of selected stations was only 26, of which 13 were municipal. The maximum load on the undertakings aggregated 2,373,000 (2,202,000) kW, including bulk supplies given, and on generating stations alone 1,855,000 (7,629,000) kW. To correspond with the latter 5,952 (5,121) million kWh was generated; of this 5,828 (4,995) million kWh was under the direction of the Central Electricity Board. The contribution of local authorities was 1,217 (991) million kWh.

Connected load totalled 7,333,000 (6,357,000) kW, of which 2,944,000 (2,587,000) kW was municipal, a total advance of 15.4 (14.7) per cent. The number of consumers rose by 10.3 (11.8) per cent. to 2,205,000, 1,177,000 being municipal. In addition to the above figures 1,076 (1,043) million kWh was generated by railway and transport authorities, of which the London Passenger Transport Board was responsible for 826 (799) million. By the inclusion of these the kWh generated per head was raised from 655 to 773 (564 to 678). No particulars regarding private generating sets are available.

Excluding bulk supplies to authorised undertakings the kWh sold increased by 13.3 per cent. to 4,281 million kWh—1,743 million kWh by municipalities. Apportioned to different classes of consumers the percentages were: Lighting, heating and cooking, 50.9 (49.9); power, 35.3 (35.7); public lighting, 2.3 (same); and traction, 11.5 (12.1).

Revenue from lighting and domestic supplies worked out at 1.73d. (1.84d.) per kWh, from power 0.80d. (0.81d.), from public lighting 0.97d. (0.98d.), and from traction 0.47 (same). Separately metered lighting supplies came to 3.06d. (3.12d.) per kWh, and for heating and cooking 8.87d. (same), the price for the remainder with combined metering being 1.28d. (1.34d.) per kWh.

Capital expenditure at the end of 1936-37 amounted to £148,008,000 (£136,386,000), including £53,798,000 (£49,515,000) by municipalities and £5,036,000 (£4,593,000) by the J.E.A. Of the total 31.6 (30.6) per cent. was accounted for by generation, 55.2 (54.6) per cent. by transmission and distribution, and 13.2 (14.8) per cent. by apparatus on hire and miscellaneous items.

Working costs were £18,465,000 (£16,649,000), equivalent to 0.61d. (0.63d.) per kWh sold; they included £14,398,000 (£12,940,000), or 0.48d. (0.49d.) per kWh sold, for generation and energy purchased. The corresponding local authority figures were 0.72d. (0.73d.) and 0.52d. (same); company, 0.57d. (0.59d.) and 0.46d. (0.48d.); and the J.E.A. 0.60d. (0.54d.) and 0.51d. (0.44d.).

The gross surplus on working amounted to £3,957,000 (£3,881,000) for municipalities, £8,454,000 (£7,731,000) for companies, and £350,000 (£316,000) for the J.E.A. Municipalities appropriated £991,000 (£952,000) for interest, £1,685,000 (£1,571,000) for sinking and repayment funds, £303,000 (£326,000) for income tax, £768,000 (£592,000) for capital outlay and special expenditure, £103,000 (£319,000) for depreciation and reserve, and £155,000 (£134,000) for relief of rates.

After allocating £1,570,000 (£1,521,000) in respect of interest the companies paid £636,000 (same) to preference and £2,393,000 (£2,230,000) to ordinary shareholders, and transferred £3,554,000 (£3,209,000) to depreciation and reserve; income tax absorbed £151,000 (£139,000). Local rates paid amounted to £1,841,000 (£1,626,000)—municipalities £585,000 (£493,000)—compared with £489,000 in 1925-26.

The volume furnishes particulars for each undertaking of its Acts or Orders, system of supply, plant installed, fuel consumption, output for various uses and other statistics. The latter include figures relating to capital expended, revenue and working costs, bulk supplies and a table showing the growth in kWh sold by individual undertakings over five years compared with the position in 1913-14. A statement of published tariffs in force at January 1st, 1938, is published as a separate document.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Municipal Chief Engineers

It is well known throughout the electricity supply industry that for many years the chief engineers in municipal employ have desired that an organisation should be set up for dealing with the difficulties which arise from time to time regarding conditions of service, salaries and other matters. There is at present no representative body to which such questions can be referred as when the employers were engaged with the E.P.E.A. in setting up the National and District Joint Boards the employers quite rightly insisted on the omission of the chief officials from the scheme. Several attempts which have been made to fill the gap have been only partially successful, and certain incidents have, in my opinion, made it imperative that a further attempt should be made, and this is now being done.

I think there will be no denial of the claim that the existing organisations in the industry for dealing with similar matters to those mentioned above have functioned satisfactorily for nineteen years, and no one would desire to abolish the District Joint Councils and Boards which deal with every class of employé in an undertaking, with the exception of the chief engineer. It is to fit in the missing link that I urge every municipal representative to support the proposal for setting up joint committees, as outlined in the letter which I sent out to the municipal employers in each district, so that a real attempt may be made to find a solution satisfactory to both parties.

As to the strength of the desire of the chief engineers for recognition, it is enough to say that over 83 per cent. have already joined their association, and it has been registered as a trade union. It would obviously be possible for the chief engineers, in the event of the employers refusing to meet them, to join with another trade union so as to get representation and a right to meet the employers. If we employers force them to this, who can blame them, as all they are asking is for a recognised body of employers to meet the representatives of their organisation. W. WALKER.

Stockport, *February 25th.*

Refusal to Connect

I was very much surprised to read the remarks of Mr. C. J. Gummerson, and if the facts are as he states he has sound reason for placing his case before readers of the REVIEW.

Mr. Gummerson appears to have carried out his work in strict conformity with the regulations, and personally I am of the opinion that the supply engineer exceeded his duty by refusing to connect. It would be interesting to learn from Mr. Gummerson if he was actually compelled to supply and fit the distribution fuseboard called for by Mr. Hunter, who, in my view, was unreasonable. ALEX. MILNE, A.M.I.E.E.,

Glasgow, *February 26th. Registered Electrical Contractor.*

I am of the opinion, after reading the correspondence relating to this matter, that the installation is at fault, inasmuch that it does not comply with the I.E.E. Regulations. It is a regulation that no final sub-circuit shall consist of more than ten points or 600 W. The installation in question, would in effect constitute a final sub-circuit as there are a number of points looped together, namely "ten tiny fans" (using Mr. Gummerson's expression), and these make a total of 1,200 W.

If I had been responsible for this installation, I should have employed the following scheme. Commencing at the supply with a t.p. switch-fuse, I should have run in screwed conduit the requisite size feeds, terminating at a point adjacent to the fans with two t.p. circuit-breakers set to trip at 2 A. From these breakers I should have fed two sets of five fans each, dispensing with the local switch-fuses and using isolating switches only.

When this installation was wired, according to Mr. Gummerson, it would be necessary to take six wires into the feed side (with the exception of the last one on the circuit) of each of the switch-fuses. Was 1-in. conduit used for this entry or two ¾ in.? If not, then another rule was broken.

I think that Mr. Hunter could only refuse to connect this installation under the 600-W rule, and not, as he states, because the wiring was only protected by the main switch-fuse, as this would apply to his suggestion of a fuse board. As the meter loops are usually the most exposed wiring in an installation it would be interesting to know how Mr. Hunter proposes connecting these to the meter, especially if there is further 400-V power in the building, in which case the installation of the fans would constitute a sub-circuit and should be fused accordingly.

Mr. Steward, in this week's issue of the REVIEW, seems to think that Mr. Hunter is asking for a 10-way d.b.; I, personally, read Mr. Hunter's letter as asking for a 2-way board. If this is so then the cost of installing this 2-way board and dispensing with the switch-fuses at the motors would have lessened the installation costs.

I think the whole issue revolves around the individual interpretation of the term "final sub-circuit." FRANK BUXTON.

Overstrand, Norfolk, *February 26th.*

Mr. Gummerson seems to have missed one point in connection with his installation of ten small three-phase motors. In the event of a fault on *any one* of the switches controlling the motors it will be necessary to shut down all ten of the motors before repairs or replacements can be effected. This, apart from being unsound practice, would hardly appeal to the owner of the installation, nor would it enhance the reputation of the contractor.

Mr. Steward is at a loss to know why Mr. Hunter refused to connect up the installation. The "chapter and verse" he asks for is very simple and is contained in No. 705 of the I.E.E. Regulations, which states that "means shall be provided for cutting off the motor *and its starting gear* from the supply." Mr. Steward will appreciate that in the installation as described by Mr. Gummerson the starting switches of all the motors were looped together and, therefore, it was impossible to isolate any one motor and its starting gear. This constitutes a contravention of the Regulations, and justifies Mr. Hunter's refusal to connect. A. S. WITHERS, A.M.I.E.E.

Dewsbury, *February 24th.*

Boiling Plate Characteristics

We have read with great interest the article on this subject by Mr. W. B. Parker in your issue of February 11th. We regret, however, that the results upon which the study is based are incomplete for as they are they cannot support any conclusion.

It would indeed be interesting to publish figures relating to tests concerning different plates but all utilised under the same conditions, *i.e.*, with the same utensil. It would also be interesting to compare for the different plates the results starting from the cold and warm states.

We have examined with interest Mr. Parker's conclusions regarding the efficiency of the reflector. We think that his observations are right but that his conclusions are wrong. It is true that if one takes a radiant boiling plate reflector in aluminium or nickel and makes the reflecting surface matt one observes only a slight diminution in results.

The author thinks that this is due to the fact that these plates have a very flat surface and that the heat produced is transmitted by conduction. If this were true one must obtain a much less good result with an enamelled utensil than with an aluminium one, which is not the case.

One must not be surprised at this small diminution in results; it suggests that the word "reflector" is wrongly applied. In the case of plates the proper word to be applied is "screen." But all familiar with the laws of heat transmission by radiation know that to render a screen efficient it is enough for one of its surfaces to be polished. In the case of radiant plates the effect is very much less if the two faces are blackened.

We have read with equal interest the remarks of Mr. T. C. Gilbert in your issue of February 18th upon leakage currents; he is only too right in his assertions. We have ourselves made leakage-current tests on boiling plates and have obtained figures similar to those given by Mr. Gilbert. We consider that such plates are dangerous.

French regulations require that a plate connected to a 500-W transformer shall withstand 1,500 V for a minute when cold and 1,000 V per minute when hot (with a utensil upon it). The leakage current in the hot state, with utensil, must not exceed 1.5 mA per kW. These regulations are of great importance in France where the radiant plate is coming more and more into use.

As a contribution to the study of the subject we give results obtained with a type of radiant hotplate which is popular in France. The diameter is 180 mm. and the loading 1,800 W at 220 V and the plate withstands 1,500 V cold and 1,200 V hot. The insulation values are as follows:—

Time. min.	Insulation value megohms.	Leakage current mA.
0	Infinity	0
1	1	0
2	0.20	1.8
3	0.15	2.5
4	0.40	0.2

Above 4 minutes the figures remain stationary.

Generally speaking the study of results and electrical qualities of cooking plates has progressed in France and we shall always

be glad to communicate to you or your readers particulars which we have collected regarding these matters.

We hope that these observations will interest a number of your readers and show that in France we follow these questions very attentively.

Technical Committee, Centre du Renseignements du Chauffage Electrique,
R. SEVIN,
Paris, *February 23rd.* *Secretary-general.*

[This letter has been translated from the French original.—EDS., ELEC. REV.]

Applying for an Appointment

I note that advertising vacancies under box numbers has again been receiving attention in your columns. From the applicants' point of view many advertisements are very unsatisfactory for the following reasons:—

1. Salary required has to be stated without any knowledge of the work to be done or the responsibility undertaken.
2. The district in which the work will be is seldom stated in the case of box numbers.
3. Chances are high that no reply will be sent to unsuccessful applicants or that there will be any announcement published stating that the post has been filled, especially in the case of box numbers.
4. Lack of particulars of work involved results in a large number of unsuitable applications being made by candidates with good qualifications but not the right ones. The name of an advertiser sometimes indicates the type of work even if it is not specifically stated.

You published a letter of mine in your issue of February 2nd, 1934, in which I outlined an extraordinary state of affairs after replying to a box number advertisement in the S.W. of England. The post was a temporary one (six months with possible permanency). The advertiser read my comments and actually wrote to you and asked you to forward his communication to me. The substance of it was that unsuccessful applicants not interviewed had already been informed of the result of their applications, together with some of the unsuccessful ones on the short list. Others on the short list would be informed when a final decision had been made. I am still waiting to hear the result of my application in view of the communications the advertiser addressed to me making various inquiries!! Is it surprising that applicants dislike box number advertisements?

In advertising vacancies the common practice of Government departments of generally acknowledging receipt of applications and advising candidates of the final result definitely commends itself to applicants. Even if one is unsuccessful there is some satisfaction in knowing that the matter is no longer under consideration. In a few instances stamps to the value of 2s. 6d. have to accompany the initial application and this doubtless prevents a number of entirely unsuitable applications being received. If advertisers generally adopted some such scheme and advised candidates of the receipt of their applications and of the result, even if a small application fee were charged to defray expenses, I believe it would meet with approval provided it could not be abused.

C. F. WRAY.

London, S.W.7, *February 26th.*

[Will "Ambitious," who has sent us a letter on this subject, kindly let us have his name and address—not for publication.—EDS. ELEC. REV.]

Terminating Cable

I want to ask a question regarding the treatment of paper-insulated lead-covered cables with single or double-wire armouring passing through sealing chambers to terminal points. I am referring to oil-impregnated cables and not the dry type.

Where I have been allowed to use my own discretion and there is depth and width in the sealing chamber, I have always made a damp core, *i.e.*, solidified the cores 5 to 7 in. and with the lead at the usual distance from the paper. The latter is tightly bound to the core with the requisite number of turns of tape, boiled in resin oil on the job. I have either staggered the conductors or used suitable spreaders, binding them tightly with approved oilproof, empire or similar tape to the terminal lug, leaving bare damp cores in a bitumen seal.

I have followed the practice at home and abroad on both high- and low-voltage cable ends, and have never yet heard of a breakdown. Of course, care has always been taken to ensure the correct pouring temperature and class of compound. On the other hand, many engineers insist that the cores must be taped right from the terminal point down to the paper. No other argument seems to obtain than that they either prefer it that way or it is an old practice. I have seen this idea adopted in damp places and near chemical works, and it has resulted in breakdown, either through percolation or capillary attraction *via* the tape between compound.

It seems very difficult to obtain any definite ruling or specification on the subject. In fact, it seems almost on a par with the common practice of plumbing the wire armour to the lead, without, in some cases, any regard to the weight of cable dragging on the lead sheathing.

Then, again, some engineers insist on a fat round joint, overlooking the fact that the strain is at the point where solder meets lead and that a certain amount of physical change takes place in the immediate vicinity of a joint on lead sheathing—small, I admit, but in any case the sheathing is not strengthened. In my opinion, based on practical experience, more thought should be devoted to making the armour take the strain off the sheathing.

I may say that I designed the elbow joints on H.M.S. *Vindictive* and personally completed and plumbed the core joints in January, 1916. In spite of vibration due to gunfire, &c., I am informed by the Admiralty that no trouble has been experienced with them during the twenty-two years they have been in service. These cables had conductors of 1.75 sq. in. cross section; I am informed that they are no longer made in this size.

If any reader can inform me whether the various methods have been tested, I should be glad to learn the results.

London, S.W.12, *February 24th.* J. W. MILAN.

Parliamentary News (BY OUR SPECIAL REPORTER)

Automatic Gas Detectors

In the House of Commons on February 22nd Mr. T. Williams asked the Secretary for Mines how many entries were received by the committee set up to conduct the competition for the best automatic gas detector and illuminant; how many meetings had been held by the committee; and what was the date of the last meeting.

Captain Crookshank said that he was informed by the Mining Association that five meetings of the committee had been held of which the last took place on October 20th, 1937. The thirty-one original entries were at that meeting finally reduced to a short list of four, and certain of these competitors were subsequently informed that their detectors must be submitted to the Mines Department for test and approval under the appropriate regulations, before the committee could proceed further. Tests at the Mines Department Testing Station were now in progress.

Electric Traffic Signals

On February 23rd, in reply to Mr. Day, the Minister of Transport said that the signals in Piccadilly Circus were working very satisfactorily and he was hoping that similar installations would be introduced at other busy points.

Representation on the London J.E.A.

On February 24th Captain Cunningham-Reid asked the Minister of Transport whether his attention had been drawn to the recent election of eight representatives of the sixteen Metropolitan borough councils conducting municipal electricity undertakings to seats upon the London and Home Counties J.E.A. which resulted in the largest single electricity distributing municipal authority, the St. Marylebone Borough Council, with an output of approximately one-fifth of the total output concerned, being deprived of representation upon the Authority; and, as such a result demonstrated a weakness in the Act under which such elections were held, whether he would take steps to amend the Act to remedy this.

Mr. Burgin said that the constitution of the Joint Electricity Authority was determined by the London and Home Counties Electricity District Order, 1925, which, as amended by subsequent Orders of 1931 and 1932, allotted eight members to the local authority undertakers in the Administrative County of London and prescribed a scheme of voting based on the number of units of electricity sold to govern the election of such members. While the present time did not appear to him to be opportune for considering any amendment of these arrangements, he had no doubt that the representations would be borne in mind in connection with any reorganisation of electricity supply resulting from the Government's legislative proposals.

The Distribution Bill

On March 1st Mr. Ede asked the Prime Minister when it was proposed to give a first reading to the Bill for the reorganisation of the distribution of electricity.

Mr. Chamberlain.—"In view of the heavy programme of work I am afraid I now see no prospect of being able to proceed with the Electricity Supply Bill during the present session."

Mr. Ede: "Will the right hon. gentleman consider, in view of the anxiety felt in the supply industry, making an early announcement as to whether it is proposed to proceed at all with the reorganisation of this side of the industry?"

Mr. Chamberlain: "I hope it will be possible to take the Bill early next session."

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Axle Counting Equipment

SIEMENS & GENERAL ELECTRIC RAILWAY SIGNAL CO., LTD., East Lane, Wembley, is now manufacturing an axle counter for railway use. A multi-spring treadle is clamped to the rail and contacted by each passing wheel, a separately mounted counter being actuated by electrical impulses sent from the treadle springs. In a straight through track, a treadle is provided at each end so that if the same number of wheels is counted "out" as "in" the associated counter mechanism returns to zero, indicating that the section is clear. The equipment permits forward and reverse working, therefore the operation of "dead ends" can be dealt with. The standard units are capable of operation at speeds up to 110 m.p.h.

Typical applications of axle counters are to replace relay track circuits where a goods train shunt cannot be obtained, and to give automatic protection to sections having steel sleepers. They may also be employed with considerable economy in cases where track sections are long, one set of axle counting equipment only being required to protect a long section instead of several split track relay sections. The energy required to operate the axle counter is less than that required for track circuits.

The wheel contactors consist of six sets of transversely mounted leaf springs in which no pivots are employed. The contacting springs are assembled on a welded steel housing, the whole being clamped to the inside of the rail. The flange of each train wheel passing over the treadle depresses the springs in a regular order, and the movement so given operates electrical contacts mounted in a compartment at the top of the treadle. These contacts are of substantial leaf spring construction tipped with a tungsten alloy and are immediately visible and accessible on removing the top cover.

The treadle of the "S.G.E." axle counter with the cover removed

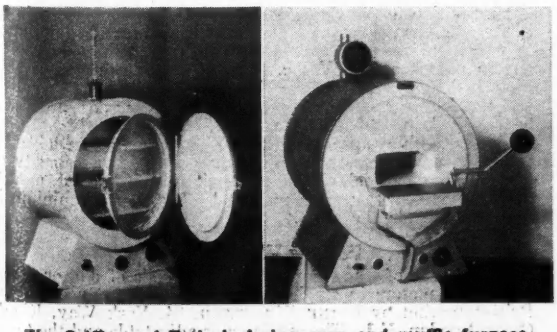
The wheel contacting spring pile-ups are set to require a very considerable pressure to effect depression, and protection is, in this way, given against extraneous operation. The counter mechanism consists of one or two step-by-step rotating field motors, the armatures of which are caused to rotate in response to the electrical impulses produced by the operation of the treadle springs. The step-by-step principle employed is inherently suited to directional counting, the field being caused to rotate clockwise for adding and anti-clockwise for subtracting.

A single motor counter is used for dead ends and straight through tracks where it is not possible for both entering and leaving treadles to be operated simultaneously. Where both treadles can be operated simultaneously, a double motor unit is employed. This consists of two single motors coupled with differential gears which gives the sum of the actual number of wheel axles in the section at any instant.

Incorporated in the unit and visible through a window is an indicator which gives a record of the number of wheel axles in the section. The counting mechanism is operated on the open-circuit principle, but closed-circuit protection is given by the employment of a separate check circuit consisting of three relays. An independent front contact is provided for track control. Operation is at 24 V d.c., but arrangements can be made for the supply to be taken from a 150-V dry battery of the type used in radio sets.

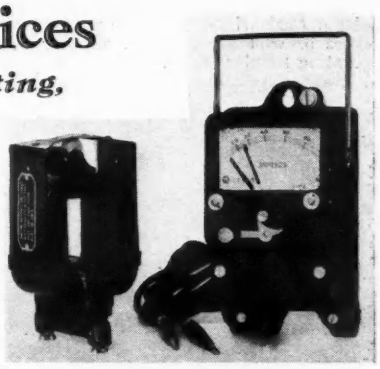
Laboratory Equipment

Two new types of electrical laboratory equipment—a muffle furnace and a drying oven, incubator and steriliser—are being manufactured by GRIFFIN & TATLOCK, LTD., Kemble Street, London, W.C.2.



The Griffin and Tatlock drying oven and muffle furnace

The muffle furnace is a new cylindrical design with automatic electric temperature control between 300 and 1,000 deg. C., a low energy consumption and thermostatic control, with a scale to assist in setting the correct temperature.



The "P.B." low-range load indicator

A rear extension of the furnace casing houses relays, switching equipment and thermocouple connections to the pyrometer indicator. Adequate louvres in the housing provide efficient ventilation and ensure that the electrical equipment is kept cool. A chimney with regulator for controlling the draught to the muffle is fitted at the back of the furnace, and there is also a mains-connection junction box. The main switch, pilot lights and temperature control knob are mounted in the front of the pedestal, and a red pilot lamp is provided, a yellow pilot lamp being illuminated when the muffle is heated. The windings on the muffle are covered with a very thick refractory cement layer, which prevents fluxing of the cement with the wire, or the shorting of one or more coils. The construction of the furnace allows for the easy replacement of the wound muffle without disturbing the electrical equipment. A special feature is the reversible door controlled by the knob on the cranked lever connected to it. On pulling the knob forward the door, supported on a metal Y-piece, rotates and the hot inner refractory lining moves downwards, while the cool outside remains uppermost and forms a hearth for material being withdrawn from the furnace.

The maximum temperature of 1,000 deg. C. is attained within about one hour of switching on, the heating up loading being 3 kW. When the furnace is empty the loading at 1,000 deg. C. is only 750 W.

The new drying oven, incubator and steriliser also has thermostatic control, and the loading according to temperature is as follows:—60 deg. C., 50 W; 100 deg. C., 100 W; 150 deg. C., 170 W; 200 deg. C., 290 W; and 220 deg. C., 350 W. The maximum temperature of 220 deg. C. is attained within an hour of switching on, the loading for heating up being 450 W.

Portable Load Indicator

A new "P.B." low-range indicator is designed to measure the average maximum load over a period of 10 to 12 min., without interrupting the supply, in a conductor carrying a current of 15 to 65 A. As the maximum load is registered by a needle whenever it may occur, a meter reader need not attend when peak load is anticipated.

The set includes the indicator with a special movement, "Easifix" split-core current transformer and flexible leads with carrying case for the complete outfit. Momentary overloads do not appreciably affect the readings as the indicator has a time lag of 10 to 12 min. A special cam device gives constant pressure on the core joints and the transformer can be clipped round a conductor in a few seconds. The window opening of the transformer is 1¼ in. square.

Indicator, transformer and flexible leads are calibrated together as a complete set to give an accuracy in the readings of within plus or minus 5 per cent. The indicator is provided with a carrying handle, feet and lug at the top so that it may be either hung up or stood in any convenient position.

The instrument is obtainable from THE "P. & B." ENGINEERING CO., LTD., Tamworth Lane Works, Mitcham, Surrey.

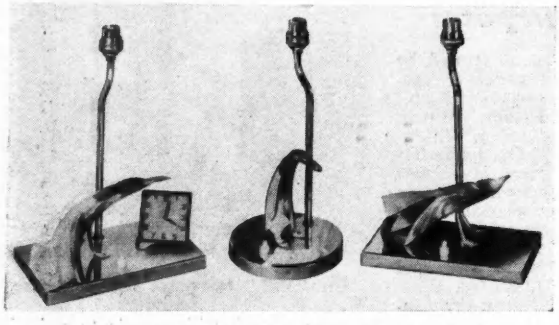
Modern Lighting Fittings

Anodised aluminium in a variety of attractive colours (eighteen to be exact) is the medium employed by BENNETT & CHANNON, LTD., 8, Greaves Place, Garratt Lane, Tooting, S.W.17, in their latest range of lighting fittings. The finish is extremely durable and will not tarnish or scratch. Lighted cigarettes left on it will leave no mark.

Combinations of the material with crystal glass and brightly coloured cord are especially effective in the wide selection of table lamps available in original, modernistic designs. The

pleasing colourings, too, have proved very suitable for various types of wall brackets and also for bedlamp fittings incorporating tubular lamps.

Another speciality of this company is a series of table lamps



A range of Bennett & Channon table standards

having fish or bird figures made of horn, each figure being individually carved.

Of rather a different class, a new low-priced chromium-plated pendant fitting is available in six neat designs taking from one to six lamps. The bowl-shaped shades supplied in a good selection of pastel colours can be mounted either downwards or inverted.

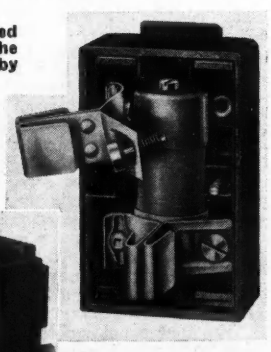
Domestic Circuit-breakers

Circuit-breakers have several obvious advantages over fuses for domestic purposes, but have been little used hitherto because of their higher cost. There is, therefore, a considerable scope for a range of circuit-breakers which the COMBI ELECTRIC CO., LTD., 85, Cromwell Road, London, S.W.7, has just put on the market at prices comparing favourably with those for good-class fuse boards.

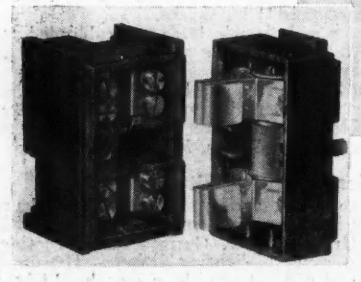
They are available either as separate units in sizes from 5 to 15 A, single- or double-pole, or arranged in the form of distribution boards. The operating mechanism, which is essentially the same as that employed in the company's circuit-breaker plug described in our March 26th, 1937, issue, is very robust, the expansion of a stout element operating a trip by means of a toggle action. Three separate successive points of contact eliminate arcing when breaking. Resetting is effected by turning a knob. The casing is of sheet metal, asbestos lined.

Replaceable Cartridge Fuses

Single-pole service fuses of the cartridge type with replaceable elements have been introduced into the insulated "Isco" range by W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, London, E.C.1. The fitting is in two main parts, a combined carrier and cover and a base. The carrier accommodates the cartridge fuse which is clamped between the underside of the cover and two tinned brass contact clips. Each clip is fixed to the carrier by a ball-headed screw and a captive cheese-headed screw. Replacement of the cartridge entails only the loosening of the captive screws, when the contact clips will hinge on the ball-headed screws.



An interior view of the combined cover and fuse carrier showing the upper contact clip released by loosening the captive cheese-headed screw. On releasing the lower clip in a similar way the cartridge can be withdrawn



The base can be supplied with single- or double-terminal fittings on either the incoming or outgoing ways, and two No. 0 brass pinching screws clamp each conductor, which may be from 0.145 to 0.06 sq. in. Bus-bars, which may be placed between the incoming terminals, are available for connecting two, three or four Iscos, the terminals being clamped to the bus-bars by screws; an extra fuse may be added without removing the existing fuses. Knock-out diaphragms are provided for both the incoming and outgoing cables and for the bus-bar entries. Full provision is made for ventilation.

Sealing is by means of a captive screw in the cover which engages with a nut in the base and is sealed by passing a wire through holes in its head and in the cover.

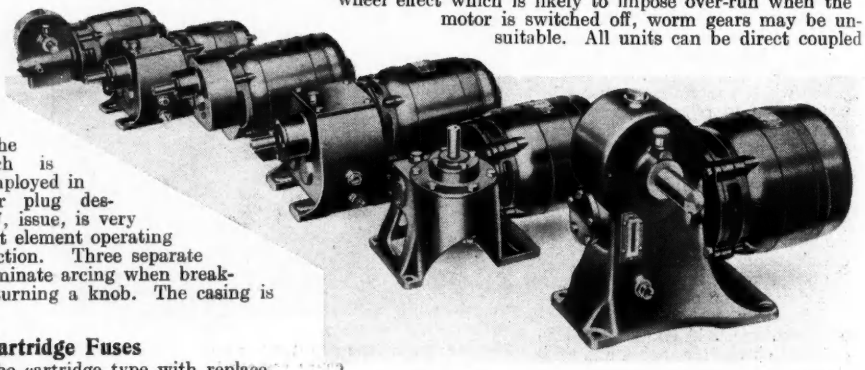
The fuse consists of a sand-filled, moisture-proofed asbestos tube containing the element, each end of which is clamped between an inner washer and a tinned-brass end cap by means of a screw. This screw passes through the centre of the cap and engages in the washer. Under the inner washer is an asbestos washer, the whole forming a closed cylinder.

A bakelite neutral-connector box is supplied with one of three different conductor fittings suitable for clamping conductors from 0.0145 to 0.06 sq. in., giving one incoming and one or two outgoing ways or two incoming ways and two or three outgoing ways. A similar method of sealing is adopted as in the Isco fitting.

Two- and four-pole bakelite sealing chambers with two cable entries and one or two reversible glands suitable for cables up to 1.22 in. can be provided. The cover plates are designed to provide a wall of bakelite round each conductor; the lower end of the wall passes into the compound, thus avoiding surface leakage. The compound-filling holes have captive covers. Bakelite identity buttons are sprung into recesses in the front half of the sealing chamber.

Geared Motors

The range of miniature motors of the geared type manufactured by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, has lately been extended. There is now a choice of four classes of speed-reducing gear, namely, single-, double- and triple-reduction spur, and single-reduction worm wheel, in each case combined with the driving motor as a single unit. The makers point out that worm gears are inherently quieter running than spur gears of the same ratio; the efficiency of the latter, however, is usually appreciably higher than that of the former. If the driven machinery has appreciable flywheel effect which is likely to impose over-run when the motor is switched off, worm gears may be unsuitable. All units can be direct coupled



B.T.H. fractional horse-power geared-motor units

or connected by belt, chain or pinion, subject to limitations of load. The low-speed output shaft has no end-play; therefore, when directly attached, a flexible coupling must be used, or, alternatively, end-play provided on the driven shaft. For belt, chain or gear drive the pulley, sprocket wheel or pinion must be so fitted to the shaft that the centre line coincides with the mid-point of the shaft extension. When this is not possible, an extra long shaft extension and an outboard bearing will be necessary.

All units are designed for mounting upon a horizontal surface, but may be inverted ("ceiling" suspension), or mounted on a wall or other vertical surface provided that the motor shaft is kept horizontal. In addition, certain units can be mounted with the shaft pointing vertically downward in those cases in which the motor component has ball bearings as standard.

These geared motor units are made in sizes from $\frac{1}{3}$ to 1 h.p. for operation on a.c. or d.c. at from 100 to 250 V.

High-surge Electrolytic Condensers

An addition to the range of electrolytic condensers made by FERRANTI, LTD., Moston, Manchester, is a new type designed to withstand repeated surges of 720 V and to remain cool if left in circuit at 650 V d.c. An important feature is that high voltage characteristic is achieved by one winding and not by using two units in series. These condensers can be supplied in cartons $4\frac{3}{8}$ in. by $1\frac{5}{16}$ in. square or with an equivalent cubic capacity in $2\frac{3}{4}$ in. length at a negligible increase in price over the 500-V peak type with a capacity of 8 μF. For tropical climates, specially constructed models can be supplied; for these no metal other than aluminium is permitted inside the cases.

Former Wound Coils

A new type of frame for winding the coils of d.c. or three-phase a.c. motors in single layers is being introduced to the British market by FRANK WHITELEGG, 34, York Way, King's Cross, London, N.1. The appliance is adjustable and the turns are controlled by a counter.

The Electrical Position in the West Indies

[From a Special Correspondent]

Recent developments in Trinidad, Barbados and British Guiana are considered to favour United Kingdom suppliers

THE imports of electrical apparatus into the eastern group of the British West Indies have increased steadily during the past few years, as shown by the following comparison of annual import values for the three major markets of this particular territory. The large increase in the 1935-36 imports into Barbados was occasioned by the installation of a new automatic telephone exchange and an extension of the plant of the local electricity supply company. Most of the equipment was obtained from the United Kingdom.

	1932	1935	1936
Trinidad	£35,023	£55,947	£57,576
Barbados	12,700	20,000	40,000
British Guiana	8,830	28,000	27,800

In the absence of detailed import data it is estimated that between 11 and 15 per cent. of the general import values consisted of covered cables and wiring, 5 to 6 per cent. of domestic appliances, and the remainder of plant and transmission equipment of all descriptions. Most of the business has been divided between the United Kingdom and the United States. The percentage of imports from those countries has varied from year to year.

There are three electric power plants of moderate size in Trinidad—one at Port of Spain, municipally controlled and supplying about 6,700 consumers; a second in San Fernando, Trinidad's second largest commercial centre, with about 2,300 consumers; and a private plant at Pointe-a-Pierre, operated for the benefit of a local oil company and its employés. The pressures employed by these plants are the uniform 110 V a.c., 60 cycles, single-phase for small applications, and 220 V, 60 cycles, single-phase, and three-phase for heavier appliances.

Prior to 1937 the Port of Spain power plant was controlled by a Canadian company which found the United States the most accessible source of supply for equipment best adapted to the local standard frequency of 60 cycles. All wire and cables, however, were obtained from United Kingdom manufacturers, whose quotations usually were the most competitive. This, together with the wire and cable requirements obtained from the United Kingdom by the local telephone company, explains the fairly even distribution of imports between the two countries. Canada obtained a moderate amount of business in insulators and special types of wire.

British Supplies Popular

Since the change to municipal control of the Port of Spain power plant, plans for plant extension, which were held in abeyance during protracted negotiations, are being actively carried out. It is expected that the improvements contemplated will result in a number of large orders for equipment during the next two years. The present management is disposed to obtain as much British-made material as possible.

While there has been a moderate increase in recent years in the use of domestic appliances such as refrigerators, fans, toasters and irons in Trinidad, the high average cost of 3½d. to 6d. per kWh for domestic consumption in the Port of Spain area has tended to limit the market. A number of leading brands of United Kingdom and United States electrical refrigerators are actively represented, but the conditions under which they are sold are extremely competitive.

Local retail prices are reflected in the quotations for a well-known American brand, which is listed at £30 for a machine of 4.24 cu. ft. capacity, £27 for one of 3.10 cu. ft., and £31 for one of 5.25 cu. ft. These prices are the same for cash or for one-third cash down and balance in nine months. There is a steady sale of small domestic appliances, 3 to 4 lb. irons retailing at 15s. and upwards, and electric toasters at 9s. 10d. and upwards. Twelve-inch electric fans of Japanese make may be purchased for £3 12s.

Due to the practice of employing native cooks and domestic servants who are not familiar with the use of electrical appliances, and because of the high cost of energy, only a small demand exists in Port of Spain for electric stoves and hot plates. There is a moderate demand in the San Fernando area, where electricity costs are lower. It is anticipated that with the enlarged plant which will become available during the course of the next two years, electricity costs in the Port of Spain area will be sufficiently low to provide a much wider market for domestic appliances than is now possible.

The Barbados Electric Supply Corporation, which operates the electricity supply plants in Bridgetown, Barbados, the leading commercial centre of the island, is controlled by English interests, with the result that most of this company's requirements are obtained from the United Kingdom. The Corporation has 4,000 consumers, who are supplied with lighting energy at the rate of 11d. per kWh consumed, plus 10d. meter charge per month. Electricity for domestic heating and power is sold at the rate of 2½d. per kWh, plus meter rent, with a discount of 20 per cent. if consumption exceeds 75 kWh monthly. The system employed by this Corporation is 110 V, 50 cycles, for lighting purposes, and 200 V, 3-phase, 50 cycles, for power.

As in Trinidad, a number of well-known brands of electric refrigerators are represented on the Barbados market. The retail prices are from £25 upwards. Retail prices for other domestic appliances are as follows: fans £1 to £7; irons 14s. 6d. to £2 8s.; toasters 9s. 8d. to £2; and hot plates 8s. to £4. To arrive at c.i.f. Barbados quotations, these prices would be subject to deduction for retail profit, agents' commission and customs duty.

British Guiana

The Demerara Electric Company, Georgetown, British Guiana, controls the electric power for Georgetown, the leading commercial centre of the territory. Purchases are made through the company's head offices in Montreal. Most of the cable equipment, etc., thus obtained has originated in American factories, while certain parts of the plant being of British origin have necessitated replacements from the same source. The position of United Kingdom products is strengthened further by the fact that the leading wholesale and import agency in Georgetown represents a well-known English electrical concern. Canada's share has been confined to porcelain insulators, meters and sundry small fixtures.

The Demerara Electric Co. has 6,125 domestic installations. Electricity is supplied at 110 V, 50 cycles, single-phase for domestic appliances of 1,000 W or less, and for larger units at 110-220 V, three-wire. Motors of over 3 h.p. are wound for 220 V, three-phase, 50 cycles. The rate for lighting is 7½d. per kWh, and energy for refrigerators, heating appliances, &c., is supplied at 1d. per kWh.

It is estimated that only about 150 electric cookers are in use in the colony, but the number of electric refrigerators is considerably higher. The high tariff on the c.i.f. value of imported electrical appliances makes such items a luxury in British Guiana. At the present time a large number of the domestic appliances are being imported from the United Kingdom, and some, on account of their low initial values, from the United States. Canadian manufacturers have found it difficult to compete successfully with the products from these two countries.

The duty on electrical apparatus imported into British Guiana is 16⅔ per cent. *ad valorem* British preferential rate and 33⅓ per cent. *ad valorem* general, plus an entry tax of 3 per cent. of the value. Imports into Trinidad and Barbados are assessed at *ad valorem* rates of 10 per cent. British preferential and 25 per cent. general, with an additional surtax of 15 per cent. *ad valorem* in the case of shipments to Trinidad and of 10 per cent. for Barbados.

Mercury-discharge lamp lighting of Kingsway, Team Valley Trading Estate. **(See p. 329)**

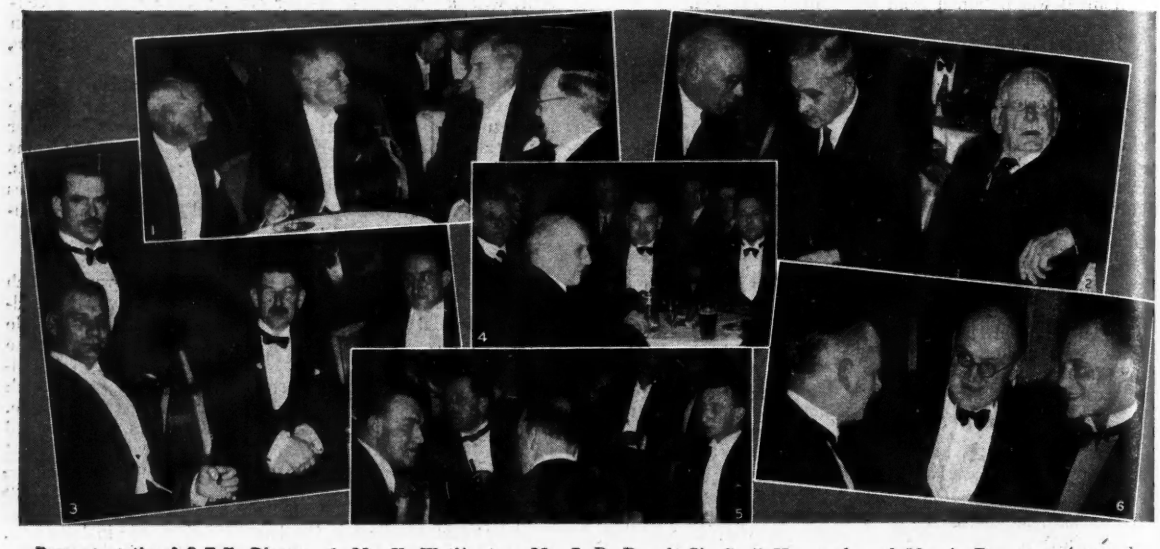
The Supervisors' Dinner

THERE were more than 470 people present at the annual dinner of the Association of Supervising Electrical Engineers held at the Trocadero, W., last Saturday, with Mr. J. R. Beard (president) in the chair. Proposing "The Electrical Industry," Sir Cyril Hurcomb (chairman, Electricity Commission) said that any new schemes of reorganisation would take account of the wish of engineers for expanding careers rather than for compensation. Compulsory wayleaves might be necessary, however, over other things than land, and many old boundaries needed to be removed.

Mr. S. B. Donkin (President, Institution of Civil Engineers), in responding, stated that, of all domestic items, electricity was the only one the cost of which had come down over the whole of Europe during the life of the Association of twenty-four years, and nowhere more than in Great Britain, where within the last five years kWh generated had gone up by 70 per cent., but the demand by only 40 per cent. The rate of growth of the electrical industry had been greater than any except the automobile and aeronautical combined. Much of its success was due to the support received from its technical Press. He referred to the formation of the Public Relations Committee, representing fourteen institutions, for the purpose of obtaining public recognition of the work of engineers.

"Our Guests" was proposed by the President, who mentioned the registration of the Association as a trade society with a view to securing adequate rewards for efficiency. The Association, he said, was interested in all supervisory grades except those in power stations. It also arranged technical meetings and discussions, in which the best effort was rewarded by the Highfield Shield. There were also sickness and death benefit schemes, and medical and dental services and advice was given regarding patents. The Association was represented on the I.E.E. Wiring Regulations Committee and on B.S.I. committees, among others. Mr. Beard then welcomed the many distinguished visitors.

Mr. H. A. Crabtree (chairman, A.S.E.E.), supporting the President, referred to the presence of four past-presidents of the Association, the first chairman (Mr. Crowdy) and the oldest member, Mr. Belcher. His reference to the need for compulsory wiring regulations and registration evoked appreciative response. Responding, Mr. H. W. Swann (Senior Electrical Inspector of Factories) specified as the three main items in excess current protection as input behind the fuse, the load in front of it and, finally, the earth-leakage path. The third of these would be a suitable subject for investigation by the Association.



Present at the A.S.E.E. Dinner.—1. Mr. V. Watlington, Mr. J. R. Beard, Sir Cyril Hurcomb and Mr. A. Brammer (general secretary). 2. Messrs. C. Bull, J. F. Chapman and W. Belcher. 3. Mr. B. D. Ransom (standing), Messrs. G. Jelley, J. Southern and H. A. Crabtree (chairman). 4. Messrs. A. Pearman, E. H. Bates, R. Childs and L. F. Goodwin. 5. Messrs. G. E. Hoyle, T. Whetton and (right) K. Arnott. 6. Messrs. C. W. Galton, A. W. Jervis and S. G. Christian *[Elec. Rev. photos.*

In the Courts

Wanted an Electric Cooker

The defendant in an action brought at Bromley County Court last week by the South Suburban Gas Co. said that his wife had signed an agreement for the hire-purchase of a gas cooker without his consent; he wanted an electric cooker. The claim, which was successful, was for £4 10s. for one instalment and 40 per cent. of outstanding instalments after the return of the cooker to cover the company's loss.

Counsel for the plaintiffs said that the case was of some importance as it would affect a large number of persons using gas cookers. During the proceedings it was mentioned that defendant's request to the company to disconnect the cooker was on a printed postcard which appeared to have been specially supplied from "some outside source."

Urban Electric Supply Co., Ltd.

In the Chancery Division on Monday Mr. Justice Bennett had before him a petition by the Urban Electric Supply Co., Ltd., for the sanction of the Court to a reduction of its capital from £1,050,000 to £525,000. Mr. Gordon Brown for the company stated that the reduction was to be effected by returning capital to shareholders, being money in excess of the wants of the company, owing to the realisation of certain assets.

His Lordship confirmed the reduction.

Disputed Electricity Account

Mr. T. Eastham, the Official Referee, on February 24th concluded the hearing of an action brought by the County of London Electric Supply Co., Ltd., to recover from Mr. F. E. Penney, a licensee of East Mitcham, about £180 for electricity supplied to the defendant's premises.

The main dispute turned upon a sum of £140 which the plaintiff company claimed as being due from the defendant as undercharges of £10 per quarter for 14 quarters in the accounts delivered owing to an error in the plaintiffs' office.

The defence was that defendant had each quarter paid the company what he was asked to pay and that in the circumstances it was estopped from claiming that any further sum was due from him. In reply to that the plaintiffs pleaded that no such estoppel as the defendant alleged could prevail.

After some evidence had been given it was announced by Counsel that the defendant had consented to judgment being entered against him for £140 and costs and the Official Referee entered judgment accordingly.

Pentode Valve Patent Action

In the Chancery Division on Tuesday last Mr. Justice Morton delivered his considered judgment in the motion made on behalf of the Mullard Radio Valve Co., Ltd., for leave to amend the specification of letters patent No. 287958, dated December 24th, 1926, for a particular form of pentode valve. (See our last issue, p. 288.)

Having dealt with the technical evidence given before him and the arguments of counsel on both sides on the question of the proposed amendment, his Lordship said that he had come to the conclusion that he ought *not* to refuse the amendment required. He would allow it, subject to the terms that no action was to be taken by the plaintiffs against any person, firm or company in respect of the manufacture, sale or user of any discharge tube manufactured before the present date which would be an infringement of the claim as now amended.

His Lordship said he would hear counsels' arguments on the exact form of the Court's order on the following day.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Manchester Electrical Circle

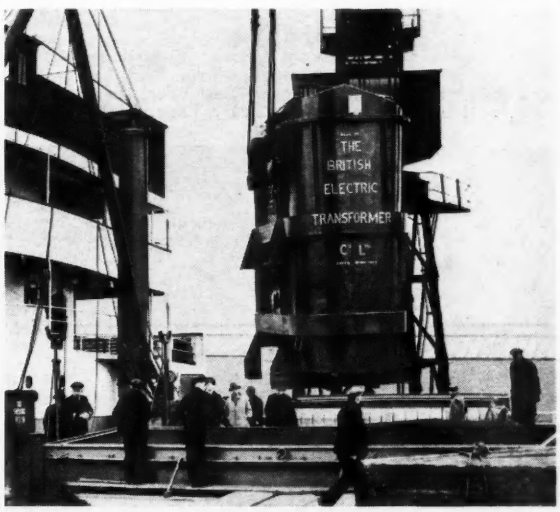
Manchester Electrical Circle held a meeting on February 22nd at which the question of canvassing for installations was discussed. It was pointed out that contractors sometimes canvassed a district and submitted the applications for an electricity supply to the Corporation Electricity Department, only to be informed that that particular locality could not be considered for the time being. Cases had arisen where, despite that decision, other contractors subsequently got the work of wiring the houses. The contractors who undertook the original canvass felt aggrieved by this. It was decided to make inquiries with a view to finding out which districts were deferred and which might be safely canvassed for wiring work. Mr. G. M. Brewster, who presided, reminded contractors that in accordance with the I.E.E. rules 5-A plugs had to be wired back to a separate pair of fuses. The meeting approved of a letter being sent out to absentee members reminding them of this requirement and indicating that the extra work of wiring back should be charged. Consideration was given to the scale of repayments in the Manchester district under the scheme of Electrical Facilities, Ltd., which is to be asked to provide for payment for eight points at 1s. per week to be spread over 256 weeks, and at 1s. 6d. per week over 143 weeks. Councillor A. T. Barratt reported having made inquiries with regard to the demonstrations of electrical and radio goods after 8 p.m. He had been informed by a responsible authority that there was nothing to prevent anyone giving demonstrations in private houses, the homes of prospective customers, after 8 p.m. The meeting accepted an invitation from Falk, Stadelmann & Co., Ltd., to visit the company's showrooms on the evenings of March 14th, 15th and 16th.

Electric Ship Maintenance

The recent visit of the turbo-electric vessel *Monarch of Bermuda* to Falmouth for her usual survey affords further evidence of the reliability of modern marine electrical equipment. This 20,500-ton luxury liner was specially designed for the New York-Bermuda service. She has been running more or less continuously for the past six years, travelling over 100,000 miles a year and making about 150 arrivals and departures, half of which are in the difficult port of Hamilton. Much more manœuvring is required than with the average liner, since she has to tie up alongside the piers and make the necessary calls at the pilot stations, and, in New York, at the quarantine station. In spite of this the inspection when in dry dock at Falmouth revealed practically no deterioration of any kind in the electric propulsion and auxiliary equipment, the whole of which was manufactured by the General Electric Co., Ltd. Such excellent condition after six years' service reflects the Furness Withy Line's high standard of maintenance. This vessel and her sister ship the *Queen of Bermuda* (which was also equipped by the G.E.C.) have carried over a quarter of a million passengers between New York and Bermuda.

A Large Transformer for Australia

A 37,500-kVA transformer, one of the largest ever shipped to Australia, has just been built by the British Electric Transformer Co., Ltd., for the State Electricity Commission of Victoria, Australia. It was taken by road from the B.E.T.'s works at Hayes, Middlesex, to the London docks, the journey occupying all night The transformer is of the three-limb core type, triple-wound, and is designed for outdoor service on three-phase, 50-cycle supply. The equivalent double wound kVA of the transformer is 49,250. Cooling is by forced oil circulation with an external water cooler. The transformer is designed to work in parallel with existing units having the same kVA and voltage ratios. The 11,000-V windings supply a synchronous condenser which will give a power factor approximating to unity on the 120,000-V supply. The h.v. bushings are oil-filled and are fitted with bushing current transformers, the m.v. and l.v. bushings being of the standard



A 37,500-kVA B.E.T. transformer being shipped to Victoria, Australia

porcelain clad type. Special equipment is included for indicating the temperature of the windings. This equipment involves the use of an element wound into the m.v. winding and brought outside the tank, *via* an insulating transformer, to an existing instrument on a panel situated in the power station. The total weight of the unit, with oil, is 84 tons, the transformer itself weighing 50 tons and the tank and accessories 16 tons.

Callender Cables

A booklet has been issued by Callender's Cable & Construction Co., Ltd., which shows by illustrations the varied uses of the company's cable in this country and in other parts of the world. These include wiring installations in houses, mansions, hotels, and industrial premises, public supply cables at home and abroad, street lighting, and wiring in ships.

A Building Centre for Scotland

In our issue of July 16th, 1937, we reported that the Scottish Development Council was taking steps to establish a Building Centre in Glasgow on lines similar to those adopted by the Centre in London. The Building Centre (Scotland), whose provisional offices are at 75, Bothwell Street, Glasgow, C.2, is now taking steps to acquire suitable premises, centrally situated, in Glasgow. The object of the Centre is to provide facilities in one building for the display of all objects and materials used in connection with the erection and equipment of public and private buildings and structures, and to give technical advice thereon. From the electrical point of view space will be reserved for electrical manufacturers of the following: Heating and cooking equipment, lighting, cleaning, washing, cables, kitchen fittings and equipment, laundry equipment, and bathroom equipment. Application forms for reservation of space can be obtained on application to the Centre.

A cooker display in the windows of the Battersea Electricity Department showrooms, arranged to draw attention to the tariff of ½d. per kWh for electric cooking [*Elec. Rev. photo.*

A P.A. Contractor's Agreement

Dealers who are interested in public address systems are being invited by the General Electric Co., Ltd., to co-operate with them in an agreement intended to promote the retail

sale and hire of sound equipment. If sufficient support is assured by the trade the G.E.C. expects to be able to direct an increasing proportion of sound reproduction business through such retail channels at prices that will enable the retailer to face direct competition. Registration under the G.E.C. p.a. contractor's agreement will be restricted to bona-fide p.a. dealers who are prepared to hold a minimum stock of equipment and who therefore have a genuine stake in the industry. To coincide with the inauguration of the agreement the company has announced the introduction of a compact new amplifying equipment known as the "Microgram," especially designed for dealers' p.a. use. This consists of a hand-microphone, a gramophone turntable combined with a 14-watt amplifier unit with "mixer" input channels, and two horizontal projection type p.m. horn speakers.

Social Events

Once again the County of London Electric Supply Co. ("Clesco") Light Operatic and Dramatic Club has tackled, and successfully produced, a complete musical comedy. This time, at the Fortune Theatre, Drury Lane, last week, the Club gave an excellent rendering of "The Street Singer." An excellent performance was given of both Percy Greenbank's lyrics and Hank and Farer Simpson's music.

The attendance at the annual J. & P. staff dance held at the Woolwich Town Hall on February 18th was a record, nearly 350 members of the company and their friends attending. Once again the evening became a general reunion for J. & P. engineers from all parts of the country. Mr. Charles Stewart attended from the board and Mr. P. V. Brittlebank, general sales manager, together with Mrs. and Miss Brittlebank and Mr. and Mrs. D. G. Rodger, were also present.

About 300 members and friends of the Sunderland Corporation electricity undertaking's Sports and Social Club attended a whist drive and dance held on February 18th. Among those present were the Mayor of Sunderland (Ald. G. Ford), the Deputy Mayor (Ald. J. Miles Walton), Ald. E. Johnston (chairman of the Electricity Committee), Coun. A. H. Suddick (vice-chairman) and Mrs. Suddick, Mr. W. A. Royle (borough electrical engineer and manager) and Mrs. Royle, and Mr. R. D. Spurr (deputy borough electrical engineer).

The annual carnival of the English Electric Social and Athletic Association, Stafford, was held recently and owing to the large number of employés and the consequent increase in the number of members of the Association, it was this year extended over twelve nights, during which period approximately 7,000 employés and their friends were entertained. The illustration below shows Mr. G. H. Nelson (chairman and managing director of the company) and Mrs. Nelson, the Mayor and Mayoress of Stafford (Ald. and Mrs. F. G. Amies), and members of the management and staff officials of the company who attended on February 23rd.

At the Bradford Contractors' dinner (left to right): Ald. J. W. Longley, Mr. T. Roles (borough electrical engineer), Mr. R. W. Kennedy, Sir Eugene Ramsden, Mr. H. Moss, Mr. H. E. Walker, and Mr. L. C. Penwill

New Fields for Industry

The Commissioner for the Special Areas has sent us a booklet entitled "New Fields for Industry," which has been issued jointly by the Commissioners for the Special Areas in England and Wales and in Scotland. This sets out briefly the inducements which can now be offered to industrialists contemplating the setting up of undertakings in the Special Areas. Full information as to the nature of the facilities offered is given.

Bradford Contractors' Dinner

The annual dinner of the Bradford Branch of the Electrical Contractors' Association was held on February 25th at the Great Northern Victoria Hotel, Bradford. Mr. H. E. Walker (president of the Association) said that the Association's goal was a satisfied and appreciative general public, peace and harmony between all sections of the industry, and the anchorage in the industry for employer and employed which was the right of those who faithfully fulfilled their allotted task. The past year or so had given evidence of great improvements and advancement everywhere, and there was no doubt that the next few years would see very great advances in the application and adoption of electricity. Mr. H. Moss (chairman of the Branch), who presided, proposed the toast of "The City and Trades of Bradford," and gave the whole of his speech in rhyme. Mr. L. Jessop (deputy Lord Mayor) responded. Among those present were Sir Eugene Ramsden, M.P., Mr. L. C. Penwill (director of the E.C.A.), Ald. J. W. Longley (chairman of the Bradford Electricity Committee), and Mr. A. Smith (vice-president of the E.C.A.).

Russian Orders

Some information regarding the expenditure of the £10,000,000 credit provided by the Anglo-Soviet Agreement of 1936 was given by Mr. N. A. Bogomolov, Trade Representative of the U.S.S.R. in Great Britain at a recent meeting of the Executive Council of the Russo-British Chamber of Commerce. He divided the orders placed into five classes including "Ship's auxiliary machinery, turbines and generators, valves and regulators, floating dock, and dredger buckets," £1,973,239; and "telephone and telegraph equipment," £466,890.

Zinc Development Association

The Zinc Development Association, Ltd., which has recently been formed, is a non-commercial organisation, its objects being to give consumers technical information on the methods of using zinc in the building and other industries. The Association has offices at Great Westminster House, Horseferry Road, London, S.W.1 (telephone: Victoria 7581). Persons with technical inquiries are invited to use the resources of the Association, which has on its staff assistants who are

Some of the members and friends of the English Electric Social and Athletic Association who attended the recent annual carnival at Stafford

experts in the different methods of using zinc. Booklets will be issued in the near future giving technical data on zinc and its uses for different purposes.

United States Electrical Exports

The exports of electrical machinery and allied material from the United States during 1937 attained a value of about £22,521,800, as compared with £18,270,400 in 1936.

Lamp Works Extension

The Beacon Lamp Co., whose new factory at Oulton Broad, near Lowestoft, has now been completed, is fully equipped for the manufacture of automobile lamps. The factory, which stands on a ten-acre site, has a capacity of 36,000 lamps per day. The company was founded by Messrs. A. Rist and A. C. Doo, who are also directors of Homo, Ltd. The company is doubling its factory area and commencing the manufacture of domestic lamps, for which some of the special plant has already been delivered. It is anticipated that full production of these lamps will begin in a few months.

Parolle Electrical Plant Co.

In recording the registration of the Parolle Electrical Plant Co., Ltd., in our last issue, we stated that one of the directors was Mr. P. E. Newman. This should have read Mr. P. E. Newnam.

Public Health Exhibition

A feature of electrical interest at the Hospitals, Nursing, Midwifery and Public Health Exhibition held this week at the New Horticultural Hall, Westminster, is the display by the British Electrical Development Association, which occupies a prominent position in the hall. Incorporated in a modern setting the exhibits comprise a variety of electrical appliances used in the sick room for treatment in illness and to promote more rapid convalescence. In addition, the Association has used the opportunity to impress upon nurses the important relationship between preventative measures in the treatment of disease and health maintenance and the use of clean methods of cooking, heating and water heating.

Catalogues Required

Mr. S. Kershaw, wholesaler, &c., electrical, cycle, motor, hardware and allied trades, 93-104, Pershore Street, Birmingham, 5, has extended his wholesale and factoring business and asks for manufacturers' catalogues of electrical accessories and equipment.

Prices of Materials

Henry Gardner & Co., Ltd., report, March 2nd: Copper bars (best selected), sheet and rod, £77, £2 increase. English pig lead, £17 10s., 5s. decrease. Spelter, £14 5s., 11s. 3d. decrease. English block tin, £185 15s., £1 5s. decrease.

Frederick Smith & Co. report, March 2nd: Electrolytic copper bars, £44 10s., 15s. increase. Ditto, ditto, wire rods, £49 10s., 15s. increase. Ditto, ditto, h.c. wire, 7⅛d., $\frac{1}{16}$d. increase. Silicium bronze wire, 8⅛d., $\frac{1}{16}$d. increase.

Edward Till & Co. report, March 2nd: India-rubber, Para fine, 6d., ¾d. decrease.

Birmingham Handbook

In July next the City of Birmingham is to celebrate the centenary of the granting of its Charter of Incorporation, and this year's edition of the "City of Birmingham Handbook" deals appropriately with the progress of civic government in the city through the century. Following an account of the city's history, the handbook describes the duties and responsibilities of the various Corporation administrative departments. The chapter on the electricity undertaking describes and illustrates its progress from its inception by a small electric lighting company, in 1882, to the present Hams Hall station with a capacity of 240,000 kW. There is also a chapter showing the progress made by the transport undertaking.

Trade Announcements

Mr. Ernest W. Merredew, electrical engineer and contractor, has removed to 23, St. James' Road, Kingston-on-Thames, where he has opened new showrooms, offices and stores.

The Consolidated Pneumatic Tool Co., Ltd., is removing its general offices, repair shops and showrooms on March 7th to 232, Dawes Road, London, S.W.6 (telephone: Fulham 7722; telegraphic address: Caulking, London).

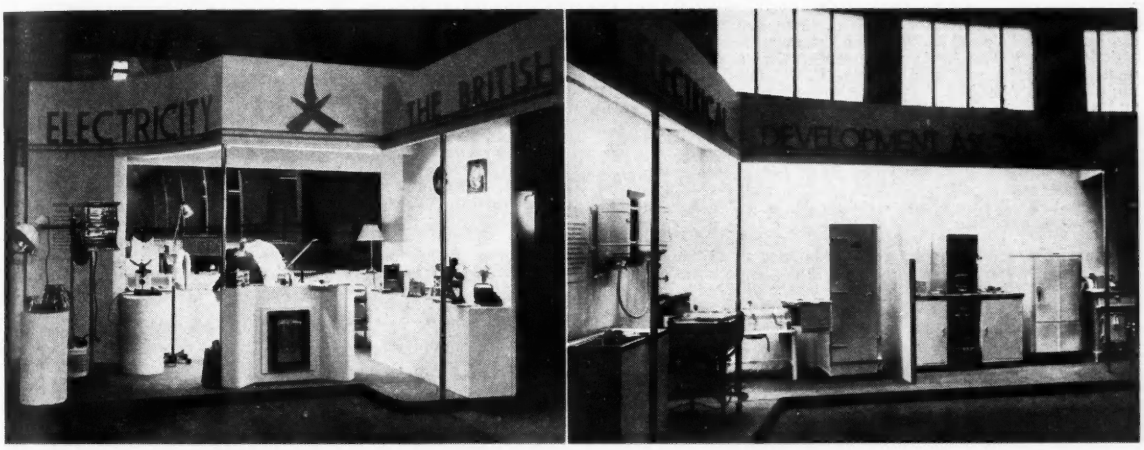
The Empire Exhibition, Glasgow

Speaking at a luncheon given by the British Empire League on February 25th, Lord Elgin said that the guarantee fund for the forthcoming Empire Exhibition stood at about £750,000. The Exhibition would be divided into three parts—cultural, industrial and amusement—and its aim was to try to bring together from near and far the citizens of the Empire and enable them to see the great force which the British Empire could be in the interests of the peace and prosperity of the world in general. Sir James Lithgow suggested that the Government might do more to help in making the Exhibition known. It was an Empire Exhibition and they wished the whole Empire to benefit.

It is announced that arrangements have practically been completed for the visit of the King and Queen to Glasgow on May 3rd for the opening of the Exhibition.

Price Increase

Ferranti, Ltd., announce that owing to the rise in the cost of labour and materials during the past few months the prices of their small ammeters and voltmeters have been advanced as from March 1st. Lists are being reprinted and will be available shortly.



Two views of the E.D.A. display at the Public Health Exhibition which is being held this week at the New Horticultural Hall, Westminster [*Elec. Rev. photos.*

New Catalogues and Lists

British Thermostat Co., Ltd., Teddington Works, Sunbury-on-Thames, has issued a blotter in red, white and blue incorporating a calendar for January, February and March.

Allen West & Co., Ltd., Brighton, 7.—Details of new e.h.v. metal-clad switchgear known as type "O.B."

Davidson & Co., Ltd., Sirocco Engineering Works, Belfast.—Booklets dealing with pneumatic collection of wood shavings and sawdust and flue dust collectors.

Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, London, E.C.4.—An illustrated art booklet dealing with the "Callender" wiring system with "c.r." boxes.

Heayberd & Co., 10, Finsbury Street, London, E.C.2.—A leaflet describing new 8-A battery chargers.

Electro-Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—A new radio convertor leaflet.

John Ismay (Neon Signs), Ltd., Stirling Works, Dagenham.—A wallet containing illustrated leaflets on neon signs for advertising purposes.

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, E.C.4.—An illustrated catalogue of "Benjamin" reflector fittings and lighting specialities.

Martindale Electric Co., Ltd., The Hyde, London, N.W.9.—Leaflets describing "Commstones" for commutator trueing, electric blowers, undercutters, growlers, etchers and syrens.

Northern Steel & Hardware Co., Ltd., 7, Gartside Street, Manchester, 3.—A leaflet describing a new external bag vacuum cleaner.

Private Arrangements

Ashton Electric Co. (Preston), Ltd., wireless and electrical dealers, Chapel Street, Preston.—An informal conference of the creditors was held recently, having been convened by Mr. H. Southworth, of Chapel Street, Preston, the receiver for the debenture holders. The statement of affairs showed ranking liabilities of £5,703, and in addition there were fully secured

creditors for £2,216. The net assets were £5,259, leaving a deficiency, as regarded the creditors, of £444. The company was registered in April, 1923, with a nominal capital of £1,500, which in December, 1935, was increased to £5,000. Up to 1929 the company carried on business with success and in the next four years the business showed a marked expansion, principally due to the company taking advantage of the assisted wiring schemes. During the year to March, 1933, the turnover was £14,591, with a net profit of £1,184. The company did a considerable amount of work for the Preston Corporation, but that body finally decided to do its own wiring and the company was faced with a drop of something like 50 per cent. in the sales. It was then decided to develop the radio side of the business. The company for a time financed its own hire-purchase business, with the result that shortage of capital was experienced and a loan of £600 from the directors was obtained, while £700 was borrowed from the bank. A debenture was issued in October, 1936. For the year to March, 1936, the profit on the trading was £503, but in the succeeding twelve months there was a loss of £488. During the half year to September, 1937, there was a further loss of £396, and it was estimated that in the succeeding fourteen weeks there was a loss of £289. The debenture holders were the bankers and they appointed a receiver on January 5th last. During the discussion which took place the opinion was expressed that the electrical contracting side of the business could be carried on successfully, and it was decided that a committee should be appointed to act with the receiver.

S. J. Samuels, trading as Britannia Wireless Cones and Chassis, and as Britannia Accessories Co., Hyde Road, London, N.1. and Exmouth Street, E.C.—At the meeting of creditors held recently a statement of affairs as at January 31st last was submitted which disclosed liabilities of £1,956, of which £1,358 was due to creditors for goods supplied, there were expense creditors for £55, loan creditors' claims totalled £181, and the balance was due to the bank. The net assets were £313, leaving a deficiency of £1.643. The creditors resolved that, providing debtor's wife withdrew her claim against the estate, the matter should be dealt with under a deed of assignment to Mr. M. Banus, 17, Finsbury Pavement, E.C., as trustee. A committee of inspection was also appointed.

H. G. Gordon, radio engineer, 80, London Road, Brighton.—A meeting of the creditors was held on February 18th at the Holborn Restaurant, London, W.C. The statement of affairs disclosed liabilities of £2.714. The net assets were £100, leaving a deficiency of £2,614. It was decided that a deed of assignment should be executed to Mr. F. E. Bendall, of Messrs. Poppleton & Appleby, 4, Charterhouse Square, London, E.C., and a committee appointed to consider the matter further and if possible obtain a higher figure for the creditors.

Bankruptcy Proceedings

J. H. Metcalf, 82, Clivedon Avenue, Perry Barr, Warwickshire, lately 261, High Street, Smethwick, Staffs, and 171, Summer Lane Birmingham, wireless dealer.—The first meeting of creditors was held at the Official Receiver's Office, 159, Gt. Charles Street, Birmingham, on February 18th. The statement of affairs presented showed gross liabilities of £3,086, of which £1,212 was expected to rank for dividend, and there were estimated assets of £179, leaving a deficiency of £1,033. The case was left in the hands of the Official Receiver as trustee.

G. Linds, electrical contractor, 4, Red Lion Street, Holborn, W.C.—The public examination of this debtor was held on February 25th before Mr. Registrar Parton at the London Bankruptcy Court, the accounts showing liabilities of £810 and assets "cash in hand 10s." The failure was attributed to heavy family expenses, insufficient working capital and trade depression. The examination was concluded.

W. F. Hurrey, trading as the Bijou Portable Radio Co., 157, Junction Road, Highgate, N.19, radio dealer.—The application for an order of discharge was considered before Mr. Registrar Kean at the London Bankruptcy Court on February 24th. The Official Receiver reported that debtor failed in October, 1931, with liabilities of £379, and a dividend of 5s. 8d. in the £ had been paid. The discharge was granted subject to a suspension of nine months.

G. W. Jump, electrical engineer, 143, Sussex Road, Southport.—Receiving order made February 17th on debtor's own petition. Public examination March 15th at the Court House, Government Buildings, Victoria Street, Liverpool.

R. Terrell, electrical apparatus manufacturer, 56, Queen's Avenue, N.10.—Application for discharge to be heard on March 22nd at Bankruptcy Buildings, Carey Street, W.C.2.

W. R. Mew, wireless and electrical engineer, "Silvermere," Lushington Hill, Wootton, I. of W., formerly trading at Bembridge and St. Helens, I. of W.—Trustee, Mr. A. L. Medcalf, 87, High Street, Portsmouth, Official Receiver, released February 9th.

J. V. Barke, wireless manager, 27, High Street, Ruislip.—Composition of 5s. in the £, payable February 28th at 8, Forbury, Reading.

J. F. B. Wallen (Auto Radio Co.), 191, Elgin Terrace, Maida Vale, London.—Receiving order made February 23rd on a creditor's petition. First meeting March 9th and public examination. April 5th at Carey Street, W.C.2.

M. Healey, radio dealer, 51, Broomhill Road, Bulwell, Nottingham.—Receiving order made February 21st on debtor's own petition.

R. C. Marshall (Northern Service Depôt), radio dealer, 313, Stretford Road, Manchester.—Discharge suspended for two months until March 31st.

D. P. Phillips, formerly trading as radio dealer, Cartref, Talog, Carmarthen.—Trustee, Mr. H. W. Thomas, 4, Queen Street, Carmarthen, Official Receiver, released February 11th.

Company Liquidations

Cookham & District Electricity Corporation, Ltd.—Particulars of claims to the liquidator, Mr. E. G. F. Cartwright, 15, York Buildings, Adelphi, W.C.2, by March 17th. All claims have been, or will be, paid in full.

Henderson's Wholesale Electrical & Radio, Ltd.—Meetings March 28th at Brettenham House, Waterloo Bridge, Strand, W.C., to receive an account of the winding-up by the liquidator, Mr. A. C. Lucas.

Major Radio & Television, Ltd.—Winding up voluntarily. Liquidator, Mr. M. Bradford, Shell Mex House, Strand, W.C.2.

Dissolution of Partnership

Bucks Relay Service, radio relay service proprietors, 106A, Bellingdon Road, Chesham.—Messrs. A. S. How and P. J. Phillips have dissolved partnership. Mr. Phillips will attend to debts and carry on the business.

E.D.A. Annual Luncheons

At Manchester

SPEAKING at the annual luncheon of the North-West England and N. Wales Area, which was held on Monday last at the Midland Hotel, Manchester, Ald. W. Walker, of the Central Electricity Board, said that the idea that we were nearing saturation point was not true. Openings for electricity were widening day by day. He could not understand how any electricity supply undertaking could decide to remain outside E.D.A. They were taking advantage of the organisation and did not pay for the service they got from it. The E.A.W. was training women to sell electricity to potential consumers, and he hoped they would see to it that when these trained women did secure appointments they would receive the scale of salaries arranged for the purpose.

In the sale of electricity for use in the home one of the points that ought to be emphasised was that electricity was not a consumer of oxygen as gas was. Referring to the comparisons that were sometimes made of British appliances with American manufacturers, Ald. Walker said that there were many British electrical manufactures, especially h.v. switchgear, that were far better than the general U.S.A. practice. American tariffs were, however, better than ours. It was a reflection on the industry that it was unable to come to an agreement as to what was the best basis of domestic tariffs. Although the rateable valuable system might not be the best on technical grounds, it did seem something which the average householder could understand. In order to put an end to the present confusion, one tariff was required. If the Government brought about an absolute and fundamental basis for ascertaining rateable value for all premises, based on letting value, it might facilitate matters.

Sir Harry Brittain said that England had outstripped America in the matter of electric cooking. With one million cookers, this country was showing a greater rate of expansion than the U.S.A. It was not realised what contribution was made by electricity to the financial structure of the country. The revenue it produced ran to £80,000,000 a year or over £10,000,000 more than gas. The industry employed 335,000 people and the number was increasing. The advertising programme of E.D.A. for 1938 exceeded by 50 per cent. the entire revenue of the organisation five years ago.

Earlier in the day, the finals of the Area public speaking contests took place. The Lord Mayor of Manchester presented the prizes:—Ladies: First, Miss Constance Williams (Wrexham Corp.); second, Miss M. Lawson (Bury Corp.). Men: First, Mr. H. Hewitt (Swinton & Pendlebury Corp.); second, Mr. J. Allen (Ashton-under-Lyne Corporation).

The Cardiff Gathering

The annual luncheon of the South West England and South Wales (Northern) Area of the British Electrical Development Association was held at the Park Hotel, Cardiff, on February 23rd. The toast of the Association and the Area Committee was proposed by Mr. D. A. Duncan, manager of the South Wales and Monmouthshire Trading Estates, Ltd., who said he hoped that the electrical industry would meet possible consumers more than half way and reminded the industry that the employment of large numbers of workers on the trading estates would put money into the pockets of the people of these districts. He urged manufacturers of electrical apparatus to take factories on the trading estates. In responding, Mr. A. C. Cramb, director of E.D.A., put forward figures to prove that of consumers on two-part tariffs the majority were paying ½d. or less per kWh for electricity. It was a fact that the strongest supporters of electricity for domestic use were to be found in the homes of the low wage earners, and on the industrial side small factory owners were finding electricity of great value because power was obtainable without big capital outlay. He was surprised that Cardiff, in dealing with the scrapping of their tramway system, should even consider oil buses, and said they should, being so dependent on the coal industry, set an example to the rest of the country by using trolley-buses. The Association was preparing a novel exhibit for the forthcoming Royal Show in Cardiff in which a complete farmstead electrically equipped would be shown in operation. A model of this exhibit would be shown at the Welsh Industries Fair to be held in Cardiff in March. Mr. L. Howles, chairman of the Area Committee, also spoke in response to the toast, and Mr. E. Jones presented the prizes in the Area Public Speaking Competition to Mr. H. W. Rees (first) and Mr. N. J. Jones (second). Other speakers were Mr. J. W. Burr, the Lord Mayor of Cardiff (Ald. O. C. Purnell), and Mr. J. W. Beauchamp.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—LARGE ELECTRICITY SCHEME.—Further important extensions of the city distribution system, involving a sum of about £100,000, have been approved by the Electricity Committee. Application is to be made for a loan of this amount. Mr. A. Gardner, the city electrical engineer, in his report to the Committee, explains that the maximum demand on the system as a whole has increased by about 15 per cent. over that of last winter, and in various parts of the area cables and sub-station plant are fully loaded or nearing the limit. Apart from the £47,485 needed for new feeder cables, Mr. Gardner estimates the cost of other work at £50,420, of which £6,248 is for plant and £44,172 for mains and services.

LIGHTING IMPROVEMENTS.—The Watching and Lighting Committee has agreed to light the new bridge over the River Dee and the approach roads by electricity. Suggestions for improving the lighting in certain streets are to be considered by a sub-committee.

Bedfordshire.—PROPOSED NEW POWER STATION.—In connection with the proposal to erect a large power station at Little Barford the B.C. and H. Power Station Co. has been formed with a nominal capital of £100, states the *Financial Times*. It will enter into agreements with the Beds, Cambs and Hunts Electricity Co. and the C.E.B., and the directors may borrow up to £2,500,000.

Bexhill.—MAINS.—The Electricity Committee is to extend mains at a cost of £4,940.

BETTER LIGHTING.—Lighting along the sea front is to be improved by the Electricity Committee at a cost of £2,035.

Bingley.—POWER PLANT.—Sanction is being sought by the Electricity Committee to borrow £5,000 required in connection with the installation of new electric traction plant and for alterations to sub-stations in connection with the replacement of the existing tramways by a trolley-bus service.

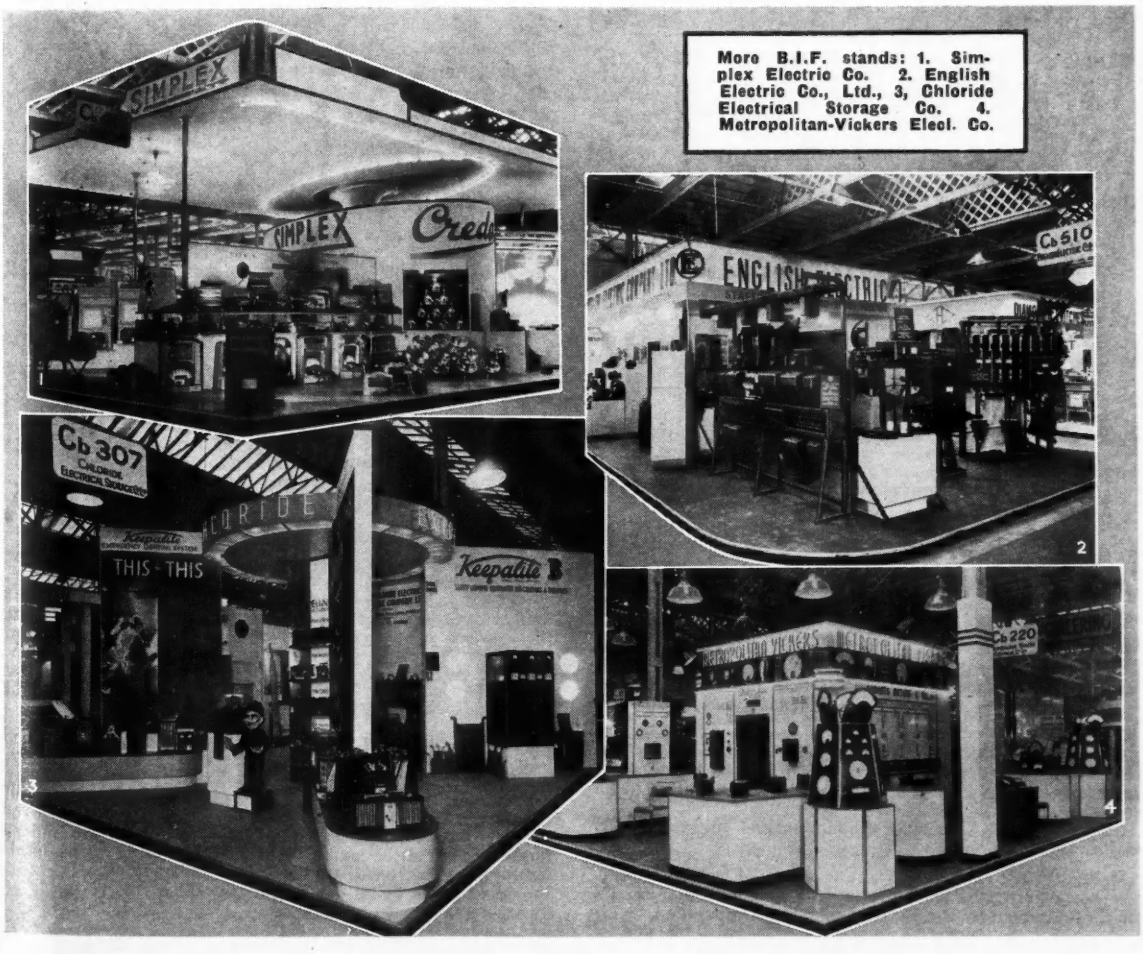
Birmingham.—DOMESTIC DEVELOPMENT.—During last year 9,445 domestic water-heating installations were provided under the Electric Supply Department's hire scheme. These included 2,983 1½-gal. storage heaters, 1,501 wash-boilers and 4,961 circulators, and as they represent the result of the first year's operation of the scheme the progress made is highly satisfactory. During the year there were also 4,343 cookers sent out on hire—double as many as installed in the previous year. The total number of cookers connected at the end of the year was 12,631.

Boston.—RURAL SUPPLIES.—The Boston and District Electric Supply Co., Ltd., is extending its lines to Kirton End, Kirton Holm, Fenhouses, Hubbert's Bridge and Leake Common Side in the Boston rural district, also to Holbeach Hurn, Fleet Church End, Sutton St. Edmunds, Sutton St. James, Whaplode Drove, Gedney Hill, Tydd St. Mary and Tydd Gote in the East Elloe rural district. In all, we are informed by Mr. H. Payn, the engineer and manager, over 40 miles of high- and low-voltage lines are involved in the initial scheme for these particular districts, and it is interesting to note that in some of the more scattered parishes, in order to deal more adequately with domestic load, a system of high- and low-voltage lines on the same supports, run for the most part along the roadside, is being installed. The company is also opening new showrooms and offices at Holbeach, the present premises having become inadequate in view of the developments in the South Lincolnshire rural area.

Brighton.—DISTRIBUTION IMPROVEMENTS.—Owing to the rapid increase in load on the distribution system over the past few years the 33-kV cables are being extended, and as the existing 8/11-kV trunk feeders are now loaded up to their full capacity it will be necessary to utilise these 33-kV cables next winter. The electrical engineer proposes to terminate the 33-kV feeder temporarily at the Kemp Town sub-station, stepping down the voltage to 11 kV to supply the eastern ring of the supply area. The cost of carrying out the necessary work will be £4,280.

Chesterfield.—CHANGE-OVER.—The Electricity Committee has approved a scheme and estimates amounting to £4,950 for the change-over of the distribution network north and east of Cross Street from d.c. to a.c.

Dunston.—TRADING ESTATE LIGHTING.—In our issue of December 3rd we described the temporary road lighting installed by the Metropolitan-Vickers Electrical Co., Ltd., in Kingsway, Team Valley Trading Estate. Permanent lighting is now being provided on the estate and represents an advanced example of road illumination. The contract, which is being carried out in co-operation with Mr. Heslop, consulting electrical engineer to the Estate, includes the supply and erection of 360 400-W "Metrovick" mercury-vapour, horizontal burning electric-discharge lamps in "Metrovick Kingsway" lanterns erected at a height of 25 ft. on concrete poles specially designed by Mr. W. Holford, consulting architect to the Estate. Along Kingsway, a wide double-carriageway thoroughfare, the lighting standards have been placed in staggered formation at 113-ft. spacing. This unusual spacing has been adopted to permit of a symmetrical layout having regard to the various exits from factories flanking the road. On the side roads the spacing is 150 ft. Watson Norie & Co., of Newcastle-on-Tyne, were responsible for the installation and erection. A photograph of the new lighting appears on page 323.



Fife.—WATER ASSESSMENTS.—The Fife Electric Power Co., Ltd., has appealed to the House of Lords against a decision of the Inner House of the Court of Session, Edinburgh, sustaining the right of the Wemyss and District Water Trust to levy water assessments on the gross annual value of the Power Company's undertakings. The Power Company claims the benefit of rating deductions amounting to 30 per cent. under the Rating (Scotland) Act, 1926. Lord Carmont, in the Outer House of the Court of Session, upheld the Company's claim, but on an appeal by the Water Trust the Inner House reversed the Lord Ordinary's judgment. Under the 1926 Act, invoked by the Power Company, rating deductions are given varying from 5 per cent. to 30 per cent. to mines, gas, electric and drainage works. Under the Wemyss Water Order the water trustees are empowered to levy water assessments on the gross annual value of rating subjects. The dispute between the parties has lasted over two years.

Hull.—CONDENSING EQUIPMENT.—To make the most efficient use of drain water for condensing purposes the Electricity Committee is to install a dam across the Beverley and Barnston drain, together with a by-pass flume at the Sculcoates power station, at an estimated cost of £7,000.

LOAN.—The Electricity Committee has obtained sanction to borrow £150,000 for mains and services.

MAINS.—Extensions are to be carried out to the high-voltage mains at a cost of £54,894.

Ilford.—DISTRIBUTION IMPROVEMENTS.—A feeder is to be laid by the Electricity Committee from the Ley Street works to the Gantshill sub-station at a cost of £2,192. Projected sub-station schemes involve an expenditure of £4,961, and loans for which the Committee is seeking authorisation include £100,000 for mains and services and £10,000 for consumers' wiring installations.

ENCOURAGING ELECTRIC COOKING.—Last Tuesday afternoon we attended the first of a series of two-hour entertainments given by the Electricity Department to popularise electric cooking. No pains have been spared to make it a thoroughly enjoyable entertainment. A musical programme is given by Jack Upson and his band, followed by a sketch in which electric cooking is introduced in a novel and amusing way. After this cooking demonstrations are given on the stage by a G.E.C. demonstrator, using a "Magnet" cooker. Free gifts and a free tea are also provided. The Electricity Department, under the management of Mr. G. F. Gregory, the borough electrical engineer and manager, was among the first to supply installations and domestic apparatus on hire, and over 7,000 ratepayers have now taken advantage of the assisted wiring facility. The domestic apparatus connected represents 125,000 kW, and includes 30,250 radiators, 22,000 irons, 9,000 vacuum cleaners and 7,500 cookers. It was one of the first undertakings to introduce a two-part tariff (1914) which is now only 10 per cent. of the rateable value plus ½d. per kWh.

Kettering.—IMPROVED MAIN-ROAD LIGHTING.—A scheme is to be prepared for the extension of central lighting on the Rothwell Road to the urban district boundary with a view to its submission to the Ministry for grant purposes. A similar scheme will be submitted for the extension of the central lighting in Barton Road from Windmill Avenue to St. Botolph's Road.

Lanarkshire.—DISCHARGE LIGHTING.—A proposal may be made to the County Council that mercury electric-discharge lamps should be erected on the main roads of the county. A committee has had under consideration the question of improved lighting on trunk roads, and the lighting engineer is to report on a scheme.

London.—INSTALLATION IMPROVEMENTS.—A proposal of the L.C.C. Public Assistance Committee for the modernisation of the Ladywell Institution includes the substitution of electric for the hydraulic lifts, the provision of a centralised heating system, and the rewiring of the electrical installation. It is proposed to discontinue the generating plant and take a public supply. The Hospitals and Medical Services Committee proposes to rewire the electrical installation at the Queen Mary's Hospital for Children, Carshalton. Power sockets for electro-medical apparatus and lights for night nurses in certain wards are also to be provided.

HAMMERSMITH.—Sanction has been obtained by the Electricity Committee to borrow £5,109 for mains and £11,674 for switchgear.

ST. PANCRAS.—The Electricity Committee is to extend mains at a cost of £1,477. It has also obtained sanction to borrow £15,932 for meters, £56,658 for mains and services, £13,047 for wiring installations and £7,972 for electrical apparatus.

Middlesbrough.—SUB-STATIONS.—The Town Council is to carry out alterations to the sub-stations in Northern Road and West Crescent and erect a new sub-station in Cumberland Road.

Morecambe.—SUB-STATIONS.—The Electricity Committee is to purchase additional switchgear equipment for the White Lund sub-station at a cost of £1,800 and a new sub-station is to be erected at Heysham (£2,100).

ILLUMINATIONS.—A scheme of illuminations costing £13,568 has been adopted.

Morley (Yorks).—MILL ELECTRIFICATION.—Electrical operation was inaugurated on February 26th at the Tingley textile mills of Humphrey Bradley, Ltd. The Corporation, with whose Electricity Department the firm has collaborated in the new installation, has lately spent £60,000 on a scheme for extended power supply.

Nuneaton.—SODIUM LIGHTING.—The Town Council has approved a recommendation by the Watch and Fire Brigade Committee that the lighting of Leicester Road should be improved by the installation of sodium lamps.

Peru.—NEW HYDRO-ELECTRIC POWER STATION.—The Sociedad Empresas Electricas Asociadas is at present engaged on the construction of a large new hydro-electric power station on the River Santa Eulalia, about 32 miles from Lima, for the supply of power to that city.

Poole.—BETTER LIGHTING.—A new electric lighting system has been brought into use, replacing gas lamps.

Rawtenstall.—SUPPLY EXTENSION.—The Electricity Committee has obtained sanction to supply electricity to certain premises in the Burnley rural district.

Russia.—ELECTRIC POWER OUTPUT.—According to the *Monthly Review* of the U.S.S.R. Trade Delegation in Great Britain the planned output of electric power in Soviet Russia during the present year has been set at 34,000 million kWh.

Sheffield.—SPECIAL LIGHTING TARIFF.—It has been agreed that electricity shall be supplied at 0.6d. per kWh for the lighting of public staircases, passages and corridors, where the owner of the building is directly responsible for paying for such lighting, and where there is no obstruction which will prevent the entry of the public at any time.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £3,206.

Shipley.—SUB-STATION.—Sanction is being sought by the Electricity Committee to borrow £1,288 for additional equipment at the sub-station in Clarence Road, and £2,849 for the sub-station in Spurr Road.

Southport.—HEATING BATH BY ELECTRICITY.—The borough electrical engineer has been asked by the Publicity and Attractions Committee to submit a scheme for heating water for the bathing lake by electricity. He has suggested that the Committee might consider a special tariff for the purpose.

Sparsholt.—ELECTRICAL EQUIPMENT.—The Hampshire County Education Committee proposes to install labour-saving equipment in the hostel of the Farm Institute in view of the difficulty of retaining the services of suitable domestic staff. A full report has been considered, and it is proposed to install miscellaneous electrically operated kitchen equipment, including a refrigerator and cold store.

Stanhope (Co. Durham).—STREET LIGHTING.—The Parish Council has obtained sanction to borrow £250 for electric street lighting.

Stoke-on-Trent.—LOAN.—The Electricity Committee has obtained sanction to borrow £20,310 in connection with the provision of 33-kV trunk mains.

MAINS.—The Committee is to lay distributors at Wolstanton at a cost of £3,250, and a feeder between the sub-stations at Gate Street and Normacot (£2,600).

CHANGE-OVER.—At a cost of £5,000 the Committee is to effect a change-over in the Sutherland Road area of Longton.

Thrapston.—SUPPLY TO NEW ESTATE.—The Rushden and District E.S. Co., Ltd., has applied to Oundle and Thrapston Rural District Council for consent to the erection of overhead low-voltage lines in connection with the proposed electricity supply to the new Chancery Lane housing estate. Thrapston Parish Council has intimated to the Rural District Council its preference for underground cables.

Tynemouth.—CABLE EXTENSIONS.—At a cost of £310 the Electricity Committee is to extend cables to the Ridges estate.

Wick.—AERODROME SUPPLY.—The Town Council is in negotiation with the Air Ministry with regard to a supply of electricity to the new aerodrome at Wick.

Traction

Belgium.—RAILWAY ELECTRIFICATION.—The suggestion that an arrangement might be made with Holland for the complete electrification of the Brussels-Antwerp railway has been put forward in the Belgian Parliament. It is pointed out that the sections between Brussels and Antwerp on the Belgian side, and between Amsterdam and Dordrecht on the Dutch, are already operated electrically. This means that only the section between Antwerp, the frontier, and Dordrecht would have to be electrified, a distance of 42 miles.

Cardiff.—TRANSPORT CONTROVERSY.—Some controversy has been raised regarding the report of the transport manager, in which he recommends the abandonment of the tramway system within two years and its replacement by heavy-oil buses. In view of the fact that Cardiff is in the centre of the coal industry, many members of the Corporation and of the public are of the opinion that trolley-buses should be used. Examples of successful trolley-bus operation in other parts of the country are being put forward in favour of this mode of transport.

Great Western Railway.—ELECTRIC SERVICE INVESTIGATION.—Last week we briefly recorded the statement by Lord Horne, chairman of the company, on Wednesday that it was proposed to prepare a scheme for the electrification of the line from Taunton to Penzance, a distance of 162 miles. In the course of his address Lord Horne said that the large increase in the cost of operating steam locomotives had made it incumbent upon the company to explore the possibility of effecting economies. Although on the section which it had under consideration electrification was not likely to give such good results as in a suburban area, it was undoubtedly the most suitable for the company's immediate purpose, as it readily lent itself to further extensions if the experiment proved to be successful. It was, of course, not possible at that stage to form a definite opinion as to the probable result of the investigation, but any decision at which the company might arrive would not be carried into effect this year.

Leicester.—MOTOR-BUSES PREFERRED.—Last week the City Council, by thirty-six votes to fourteen, approved a recommendation of the Transport Committee that motor-buses and not trolley-buses should replace the trams.

London.—TRAFFIC SIGNALS.—A letter from the Ministry of Transport suggesting the preparation of a co-ordinated scheme of traffic signals in East India Dock Road is being considered by the Poplar Highways Committee. It provides for the erection of signals with push-buttons and a special pedestrian phase at all pedestrian crossings, and for the conversion of existing and projected installations to incorporate this special phase where it does not already exist. The cost of the suggested scheme is in the neighbourhood of £15,000, towards which the Ministry will be prepared to make a grant.

Middlesbrough.—ACQUISITION OF TRANSPORT UNDERTAKING.—Negotiations are being continued for the taking over by the Corporation of the Teesside Railless Traction Board.

Newcastle-on-Tyne.—ELECTRIC TRAINS.—The first electric train service on the newly electrified route from Newcastle to South Shields, a distance of nine miles, will be inaugurated on March 14th. The Lord Mayor of Newcastle (Alderman Gilbert Oliver) will start a train from Newcastle to South Shields and the Mayor of South Shields (Alderman Bradley) will start a train in the opposite direction. The full service of electric trains is not expected to be in operation until May 2nd, when further rolling stock will be available. The electrification of the Newcastle-South Shields route has occupied about two years, and has cost, it is understood, about £500,000. The L.N.E.R. has also recently modernised its electric service on the Newcastle-Whitley Bay route by speeding up the services and introducing new rolling stock.

Southern Railway.—PROGRESS OF ELECTRIC SERVICES.—In his address at the annual meeting of the company last week, Mr. R. Holland-Martin, C.B. (chairman) said that the expenditure on capital account during the past year amounted to £2,351,000, which was spent mainly as follows:—Electrification, £972,000; additions and improvements to stations, £190,000; rolling stock, £1,053,000; and new electric line from Motspur Park to Leatherhead, £90,000. The total number of passenger-journeys, including season ticket holders' journeys, in 1937 was 378,714,000. Of the 18,452,000 increase over 1936 the electrified area accounted for 15,500,000. Last year contained one day fewer than 1936 (Leap Year), but on the other hand there was an abnormal increase in traffic due to the Coronation and bus strike.

Yugoslavia.—RAILWAY ELECTRIFICATION.—According to the Belgrade correspondent of *The Times*, an Italian company is to carry through the first railway electrification project in Yugoslavia, on the stretch between Sushak and Shkrlevo. The necessary credits have been provided for in the Yugoslav Budget. The same Italian company is also interested in the building of a hydro-electric power station on the River Korana in the Sava Banovina, and a loan of 150,000,000 dinars from the State Mortgage Bank in Belgrade has been arranged. Dr. Spaho, the Yugoslav Minister of Communications, is inspecting various Italian factories which are to deliver railway material for the Yugoslav railways to the amount of 180,000,000 dinars.

Communications

Denmark.—TELEPHONY.—The Danish Government has under consideration the report of a committee appointed to inquire into the question of the transfer to the State of the undertakings of the private telephone companies. It is estimated that a period of ten years would be required for the purpose.

Great Britain.—B.B.C. EXHIBITION.—Last Thursday Sir Stephen Tallents, the controller (public relations) of the British Broadcasting Corporation, opened the B.B.C. travelling exhibition at the Charing Cross Underground Station. The exhibition, which remains open on this site until March 24th and will later be transferred to the Empire Exhibition,

The crowd at the opening of the B.B.C. travelling exhibition

Scotland, illustrates the development of radio as a science and as an entertainment.

FUTURE OF RADIO RELAYS.—Radio relay operators have been authorised by the P.M.G. to repudiate the statements that have recently appeared in certain sections of the Press to the effect that all privately owned radio relay stations are to be taken over by the Government next year, as the Government has not yet come to any decision on this matter. At December 31st, 1937, there were 255,236 subscribers to 331 relay exchanges, the number of subscribers' licences forming 3.01 per cent. of the total number of receiving licences.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, March 11th. Institution, London, W.C.2. 6 p.m. "The Lighting Load." Mr. W. J. Jones.

Meter and Instrument Section.—Friday, March 4th. Institution, London, W.C.2. 7 p.m. "The Use of the High-Vacuum Cathode-Ray Tube for Recording High-Speed Transient Phenomena." Capt. D. J. McGillewie. "Recurrent-Surge Oscillographs and Their Application to Short-Time Transient Phenomena." Mr. K. J. R. Wilkinson.

Transmission Section.—Wednesday, March 9th. Institution, London, W.C.2. 6 p.m. "Electricity Distribution in Large Towns." Dr. Johannes Adolph.

North Midland Centre.—Friday, March 4th. Hotel Metropole, Leeds. 7 p.m. Annual dinner.

Mersey and North Wales (Liverpool) Centre.—Monday, March 7th. The University, Liverpool. 7 p.m. Cooker papers by Messrs. O. W. Humphreys and J. N. Waite.

South Midland Centre.—Monday, March 7th. James Watt Memorial Institute, Birmingham. 7 p.m. General discussion on "Electrical Engineering Education." Introductory papers by Prof. C. L. Fortescue, Col. H. C. Fraser, and Mr. F. H. Clough.

Scottish Centre.—Tuesday, March 8th. 39, Elmbank Crescent, Glasgow, C.2. 7.30 p.m. "The Electrical Ignition of Mixtures of Ether Vapour, Air, and Oxygen." Prof. W. M. Thornton. "The Risk of Explosion due to Electrification in Operating Theatres of Hospitals." Mr. E. H. Rayner.

Western Centre.—Wednesday, March 9th. Town Hall, Newport. Faraday Lecture on "The Evolution of Electrical Power." Dr. A. P. M. Fleming.

Hampshire Sub-Centre.—Wednesday, March 9th. University College, Southampton. 7.30 p.m. "The Use of Protective Multiple Earthing and Earth-leakage Circuit-breakers in Rural Areas." Mr. H. G. Taylor.

Dundee Sub-Centre.—Thursday, March 10th. University College, Dundee. 7.30 p.m. Debate on "The Grid."

Birmingham Electric Club.—Friday, March 4th. Grand Hotel, Birmingham. 6.30 p.m. Annual dinner.

Junior Institution of Engineers.—Friday, March 4th. 39, Victoria Street, London, S.W.1. 7.30 p.m. Informal meeting. Lecture on "Water Turbines." Mr. W. J. Kennelly.

Institution of Engineers-in-Charge.—Friday, March 4th. Holborn Restaurant, London, W.C.2. Annual dinner.

Salford Technical and Engineering Association.—Saturday, March 5th. Royal Technical College, Salford. 7 p.m. Lecture on "Steam and Power Plant Insulation." Mr. G. H. Kenyon.

Electrical Power Engineers' Association (*London Local Group*).—Tuesday, March 8th. Caxton Hall, Westminster, S.W.1. "Instability on A.C. Power Systems." Mr. S. R. Mellonie.

Institute of Metals.—March 8th, 9th and 10th. Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1. Annual general meeting.

British Electrical Development Association (*Northern Ireland Area*).—Thursday, March 10th. Belfast. Annual general meeting and luncheon.

South Wales Institute of Engineers.—Thursday, March 10th. Joint meeting with the Institute of Fuel. Luncheon at Hotel Metropole, Swansea, to be followed by inspection of boiler plant at Tir John. Royal Metal Exchange, Swansea. 6 p.m. "The Combustion of Anthracite Duff in Pulverised Form." Mr. J. B. Mayer.

Physical Society.—Friday, March 11th. Imperial College of Science and Technology, South Kensington, S.W.7. 4.45 for 5.15 p.m. Annual general meeting and short papers.

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, March 12th. South Wales Institute of Engineers, Park Place, Cardiff. 6 p.m. Lecture on "Modern Transformer Practice." Mr. R. M. Charley.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdare.—March 14th. Electricity and Transport Department. Apparatus and equipment for the establishment of a "Class A" meter-testing station. (February 18th.)

Abertillery.—March 17th. Electricity Undertaking. Lamps in connection with change-over from d.c. to a.c. (See this issue.)

Aberystwyth.—March 15th. Electricity Department. Meters for three years. (February 25th.)

Australia.—MELBOURNE.—June 29th. Victorian Railway Commissioners. Turbo-alternator and accessories. (T.Y. 17013/38.)*
March 29th. Deputy Director, Posts and Telegraphs. Telegraph milliammeters. (T. 18422/38.)*

Barnoldswick.—March 12th. Electricity Department. Cables for one year. (See this issue.)

Bingley.—March 8th. Electricity Department. Mercury discharge lamps. (February 18th.)

Birmingham.—March 11th. Airport Committee. Installation of electric lighting and power wiring at Municipal Airport Buildings. (February 18th.)
March 18th. Public Assistance Committee. Electric lighting and power installations and fire alarms for Birmingham Infirmary. Town Clerk's Office, Room 11A, Council House (deposit £2 2s.).

Blackpool.—March 14th. Borough Council. One raking screen, together with electric motor, starting gear and all necessary accessories, for Lennox Gate pumping station. Town Clerk, Town Hall (deposit £1 1s.).

Bridlington.—March 7th. Town Council. Batteries for use in conjunction with meter-testing equipment. (February 25th.)
March 10th. Stores for one year. (February 25th.)

Brighton.—March 8th. Electricity Undertaking. Tungsten filament electric lamps for street lighting, and v.i.r. cables for twelve months. (February 25th.)
March 10th. Four 40-in. bore outside screw motor-operated sluice valves for Southwick power station. Deputy Town Clerk, Town Hall (deposit £1 1s.).

Bristol.—March 8th. Electricity Department. Joint and fuse boxes, and cables for twelve months. (February 18th.)
March 15th. Meter-testing apparatus. (See this issue.)

Bromley.—March 9th. Electricity Department. L.v., e.h.v., and l.v. pilot cables, and a.c. meters. (February 18th.)

Chelmsford.—March 22nd. County Public Health and Housing Committee. Electrical installation at Broomfield Court Sanatorium. (February 25th.)

Chesterfield.—March 17th. Electricity Department. E.h.v., p.i., lead-covered and steel armoured cable, one 500-kVA outdoor type transformer kiosk, complete with transformer and switchgear, and one 500-kVA outdoor type transformer. (See this issue.)

Cleethorpes.—March 5th. Electricity Department. Two 250-kVA transformers. (February 18th.)

Croydon.—March 18th. Electricity Department. One cooling tower, culvert, circulating water piping, valves, &c. (February 25th.)

Dartford.—March 26th. Corporation. Meter racks. (February 25th.)

Dover.—March 4th. Corporation. Meters, transformers and cables for twelve months. (February 18th.)

Dundee.—March 16th. Electricity Department. Tower wagon. (February 25th.)
March 16th. L.v. p.i. lead-covered armoured 660-V cable. (See this issue.)
March 7th. Housing Committee. Electric lighting, Wellgrove housing estate. Town Clerk.

East Dean.—March 7th. R.D.C. One vertical borehole centrifugal type pump and electric motor, complete with accessories, for the waterworks pumping station, Greenbottom, near Cinderford, Gloucestershire. W. E. Blizard (Lemon & Blizard), 25, Victoria Street, S.W.1 (deposit £3 3s.).

Edinburgh.—March 11th. Gas Department. General stores for one year, including electrical material. Town Clerk.
March 17th. Electricity Department. Electrical materials for one year. (See this issue.)

Farnworth.—March 9th. Electricity Department. Stores for twelve months. (February 25th.)

Fife.—March 15th. County Council. Electric lighting in police station and house at Comrie. G. Sandilands, county master of works, Kirkcaldy (deposit £1 1s.).

Guildford.—March 14th. Housing Committee. Electrical installations for 120 houses and twenty-six bungalows. (February 25th.)

Hendon.—March 14th. Corporation. Electrical installation at Woodside Park Junior and Infants' School. (February 25th.)

Hull.—March 15th. Electricity Department. Underground cables. (See this issue.)

Ilford.—March 5th. Electricity Department. E.h.v. switchgear. (February 18th.)

India.—BENGAL.—March 15th. Bengal and North Western Railway Co., Ltd. 26,300 tungsten filament lamps. (February 18th.)

Keighley.—March 14th. Electricity Department. Transformers, p.i. and r.i. cables, motors and starters, and metal-clad switchgear for twelve months. Town Clerk, Town Hall.

Leeds.—March 10th. Corporation. X-ray installation at St. James's Hospital. (February 25th.)

Leyton.—March 7th. Electricity Department. Cables for twelve months. (February 18th.)
March 10th. 3,000 1½ gal. electric storage water heaters. (See this issue.)

Lincoln.—March 12th. Electricity Department. Materials for one year. (February 25th.)

Liverpool.—March 18th. Electric Supply Department. Replating of a 744-Ah control battery. (February 25th.)

London.—HACKNEY.—March 23rd. Electricity Department. Conductors for the e.h.v. feeder and l.v. distribution systems for one year. (See this issue.)

Manchester.—March 11th. Electricity Department. 33-kV, three-phase switchgear and low-pressure pipework. (February 25th.)

Middlesex.—March 21st. County Council. Electrical installation at new County School for Boys, Isleworth. (February 18th.)
March 21st. Electric lighting and power installations for Enfield House Casual Wards. (February 25th.)
March 25th. Electrical installations for proposed new county offices, Uxbridge. (February 25th.)

Middleton.—March 12th. Electricity Department. E.h.v. and l.v. underground cables. (February 25th.)

Neath.—March 14th. Electrical Engineer's Department. Electrical overhead line service material, a.c. and d.c. meters and electric lamps for twelve months. Clerk to the Council 8, New Street.

Newcastle-on-Tyne.—March 10th. Tyne Improvement Commission. One 800-kW rectifier for sub-station at Albert Edward Dock, North Shields. (February 25th.)

Newton-in-Makerfield (LANCS).—U.D.C. March 5th. Equipment, including electric fires for the Isolation Hospital. Clerk of the Council, Town Hall, Earlestown, Newton-le-Willows.
March 21st. Electricity Department. 11-kV isolators and kiosks. (See this issue.)

New Zealand.—WELLINGTON.—April 29th. Posts and Telegraph Department. P.i. telephone cable. (T. 18304/38.)*
April 28th. One automatic voltage regulator. (T.Y. 18120/38.)*

Nottinghamshire.—March 8th. Committee of Visitors of Radcliffe-on-Trent Mental Hospital. One 100-kW generating set. Clerk of the Hospital.

Portland.—March 14th. Electricity Department. Stores for twelve months. (February 18th.)

Reigate.—March 14th. Electricity Department. Meter-testing equipment. (February 25th.)

Rhondda.—March 26th. Electricity Department. Materials for twelve months. (February 18th.)

South Africa.—PRETORIA.—March 17th. Union Tender and Supplies Board. Three oil-engine driven generator sets. (T.Y. 17596/38.)*
April 7th. Single channel carrier system. (T.Y. 18298/38.)*
March 31st. One 80-kVA hydro-electric plant, for Soskop Irrigation Works, Transvaal. (T. 18412/38.)*
CAPE TOWN.—March 31st. Electricity Department. Insulated copper wire. (T. 18397/38.)*
March 29th. 15,000 50-A pole fuses, with accessories, and 500 50-A and 1,000 25-A d.p. ironclad service cut-outs.
March 30th. Overhead line material. (T. 18285/38.)*
March 23rd. Electricity Supply Commission. Insulators. (T. 18450/38.)* 26,440 lb. of hand drawn copper wire. (T. 18400/38.)* Electric light poles, pole fittings and six miles of galvanised steel stay wire. (T.Y. 18401/38.)*
JOHANNESBURG.—March 28th. Railways and Harbours Administration. Train lighting dynamos, auto cut-in switches, lamp resistances, and battery change-over switches. (T.Y. 18293/38.)*

Stockport.—March 14th. Electricity Department. Stores for twelve months. (See this issue.)

Stranraer.—March 5th. Town Council. Electric lighting installation in seventy-eight houses. Town Clerk (deposit £1).

Tredegar.—March 17th. U.D.C. Requirements for twelve months for the Electricity, Gas and Water and Surveyor's Departments. (See this issue.)

Wakefield.—March 21st. R.D.C. Electric wiring, &c., for forty-eight houses. Clerk of the Council, Council Offices, 18, St. John's North.

Warrington.—March 7th. Electricity Department. Meter-testing equipment. (February 18th.)

West Hartlepool.—March 7th. Electricity Department. Pilot and telephone cable. (February 18th.)

Whitby.—March 22nd. Electricity Department. 5,000 yd. of 6,600-V, p.i., lead-covered, wire armoured cables. (See this issue.)

Workington.—March 7th. Electricity Supply Department. Meter-testing instruments. (February 18th.)
March 21st. Stores and materials for one year. (See this issue.)

Worthing.—March 11th. Electricity Department. Meter-testing equipment and e.h.v. and l.v. cables. (February 25th.)

* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Dartford.—Housing Committee. Recommended. Electric lighting on staircases of 404 houses on the Lowfield estate (£374).—Dartford Electrical Co. Meter equipment (£776).—Ferranti. Electric vehicle (£353).—Dartford Wharfage Co.

Eastbourne.—Electricity Committee. Recommended for twelve months. 11-kV, 2-kV and l.v. cables.—Standard Telephones & Cables. L.v. joint boxes.—Callender's. Switchgear.—Ferguson, Pailin. Wiring for hired and hire-purchase installations and for assisted wiring installations.—K. R. Matthews.

Edgware.—Middlesex County Council. Electrical installation at Redhill Hospital extensions:

	£		£
Building & Colliery Supply Co. Recommended	**2,166**	Hunt & Co.	2,498
Davis Myer & Co.	2,221	C. W. Gosling	2,523
Burdette & Co.	2,321	John Holder & Co.	2,555
F. Troy & Co.	2,420	Arthur Cozens	2,678
Pinching & Walton	2,422	Central Electric Co.	2,749
Colston Electrical Co.	2,430	Page & Girling	3,076
		E. Wight & Co.	3,130

Harefield.—Middlesex County Council. Accepted. Electrical installation at staff houses (£133).—Davis Myer & Co.

Ilford.—Electricity Committee. Recommended. Cables for twelve months.—Metropolitan Electric Cable & Construction Co.

London.—L.C.C.—Electrical installations in about 790 houses and flats at Bellingham:

	£		£
Newman and Watson. Accepted ...	**6,565**	South Metropolitan E.L. & P. Co.	7,649
Ryland's Electrical Co.	6,691	G. E. Taylor & Co.	7,779
Holliday and Son (Electrical) ...	6,942	City Electrical Co.	7,798
Archibald Meckhonik	7,254	Jacob, White & Co.	7,964
Pemberton and Sturgess (Great Britain)	7,358	Electrical Installations	7,999
Ellis and Ward	7,363	Springvale Electrical Co. ...	8,778

Manchester.—Housing Committee. Accepted. Electrical installation in 244 flats at Ardwick.—E. M. Evans & Son.

Middlesex.—Health Committee. Recommended. Motor generator equipment for Central Hospital (£240).—B.T.H. Co.

Sheffield.—Electricity Committee. Accepted. Modification of sub-station switches (£4,737).—A. Reyrolle & Co.

Transport Committee. Accepted. Copper bonds (£184).—B. I. Cables.

Stoke-on-Trent.—Electricity Committee. Accepted. Static transformers (£5,433).—Met.-Vick. Electrical Co.

Warrington.—Electricity Committee. Accepted. Switchgear extensions at works of Rylands, Ltd.—Ferguson, Pailin. Modification of power station equipment.—B.T.H. Co.

Wimbledon.—Electricity Committee. Accepted. Switchgear.—Drake & Gorham (£2,813); English Electric Co. (£2,512); A. Reyrolle & Co. (£5,065). 200-kVA transformers.—Foster Engineering Co. (Thirteen at £107 each and two at £132 each); Bryce, Ltd. (Twelve at £107 each).

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

REDUXO reducing gear.

COTOBA yarn for covering wires.

HEARSON bellows-type thermostat.

Readers should enclose stamped addressed envelopes when making their inquiries.

Notes

Broadcasting Newspapers

The reproduction of newspapers in the home by the agency of the ordinary broadcast receiver and facsimile apparatus is being experimented with in the United States. The *Wireless World* says that a light-beam scanning apparatus is used at the transmitting end with a speed of 100 lines a minute, the area covered in this time being 1 in. deep and 4 in. wide. The facsimile apparatus at the receiving end varies in detail. In the Finch system 200-ft. rolls of sensitised paper are used with a coloured surface which is broken down to reproduce the transmitted "picture." The R.C.A. employs a carbon paper which is operated upon by the recording stylus. The equipment is said to be obtainable at $125, but it is thought that mass production is likely to halve this figure.

The Finch radio newspaper

The E.I.B.A. (Northern Counties Area)

The annual general meeting of the Northern Counties Area of the Electrical Industries Benevolent Association was held recently at Carliol House, Newcastle-upon-Tyne, under the chairmanship of Lt.-Col. S. E. Monkhouse (general manager and director of the North-Eastern Electric Supply Co., Ltd.). The chairman reported that £900 had been collected in the area and it was also gratifying to note that the number of firms, undertakings, &c., the members of whose staffs were becoming subscribers was increasing each year, and efforts should be continued to further the good work. During the year several cases of distress have been satisfactorily dealt with. Mr. N. S. Tennant (general manager, Newcastle and District Electric Lighting Co., Ltd.), and Mr. F. G. H. Bedford (managing director, C. A. Parsons & Co., Ltd.), were elected as chairman and vice-chairman respectively.

I.E.E. (Meter and Instrument Section)

The summer visit of the Meter and Instrument Section of the Institution of Electrical Engineers will be held in Manchester and district on May 7th. The morning programme will include visits to the Agecroft power station, Prestwich substation and the meter test room of the Salford Corporation, the Barton power station of the Manchester Corporation, the cotton mill of Tootal, Broadhurst, Lee & Co., Chetham's Bluecoat School, Hospital and Library, Rylands Library and the Calico Printers' showroom. In the afternoon the party will visit Chester. A detailed programme will shortly be issued.

"Civils" Examinations

To avoid duplication, the Institution of Civil Engineers has decided to extend exemptions in respect of certain sections of its membership examinations. For example, corporate members of the I.E.E. who have passed Part II of the electrical graduate examination will be exempt from the subject of "Applications of Electricity" in Group (i) of Section B of the Civils' associate membership examination. Similarly, corporate members of the Institution of Mechanical Engineers who have passed Section C of the mechanical associate membership examination and are holders of a university electrical degree will be exempt from the whole of the Civils' associate membership examination.

The Batti-Wallahs

The usual monthly luncheon of the Batti-Wallahs' Society took place at the Hotel Victoria on March 1st, Col. Sir Thomas Purves, president, being in the chair. The principal guest was Dr. Wm. Beaumont, of the Institute of Ray Therapy, who addressed the gathering on some of the uses of electricity in medicine. He said he would very much like to see the formation of an advisory council composed of electrical engineers, medical men and manufacturers of electro-medical appliances, to direct the efforts of those who were making electrical apparatus for the medical profession. There was one London institution which voluntarily provided 3,000 treatments per week for poor people. It was an important factor in making both the medical practitioner and the man in the street realise the value of electricity in medical treatment, yet that organisation did not receive any support from the electrical profession. It was a pleasure to use modern X-ray equipment, which was scientifically devised, because the electrical industry had put its mind to the perfection of the equipment. Ultra-violet light could be both destructive and constructively curative, while the visible portion of the spectrum could have surprising effects. For example, red was most irritating, blue was depressing, and yellow had very definite effects on the gastro-intestinal functions. There was also a great field awaiting exploration in the infra-red region of the spectrum. More direct uses of electricity included galvanic and faradic treatments, the driving of chemical substances into the system through the skin by d.c. far more effectively than by swallowing or exterior painting and the a.c. stimulation of muscles. High-frequency diathermy was a valuable means of producing internal heat, while the great possibilities of short-wave diathermy were as yet almost completely unknown. With these, and other possible means of electrical treatment at his disposal the medical practitioner was yet handicapped by the imperfection of the equipment offered to him, and co-operation was much to be desired.

Control of Street Signs

Representatives of the Metropolitan Boroughs' Standing Joint Committee together with officers of the London and Middlesex County Councils have interviewed officials of the Ministry of Transport with regard to the Committee's proposal that highway authorities should be empowered to control the colour of illuminated signs in close proximity to traffic signals or exhibited along main roads. Reference was made to the greatly increased number of signs, the colours of which were often glaring, and to the fact that as they were most abundant at intersections and junctions, confusion was caused to vehicle drivers. The Ministry undertook to give further consideration to the suggestion that powers of control additional to those already in force.

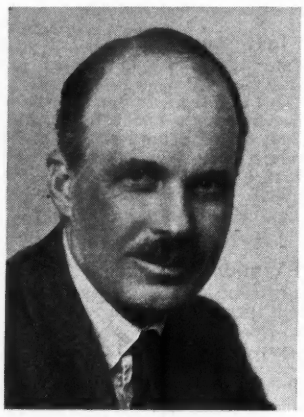
Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Sir Leonard Pearce, engineer-in-chief of the London Power Co., was in the news this week. He and his daughter, Mrs. Enid Forrester, climbed to the top of the Mönch Peak in the Bernese Oberland (13,468 ft.) last Sunday—a feat, it is said, which is remarkable so early in the year. Sir Leonard and Mrs. Forrester arrived back in London on Monday.

We are pleased to hear that **Mr. Ll. B. Atkinson** who has been recuperating at Torquay after his recent illness was able to return home to Ferndown this week.

Mr. A. C. Witts, of Maidstone Corporation Electricity Department, has been appointed power station shift engineer with the Hastings Corporation Electricity Department, to fill the vacancy caused by the retirement of Mr. J. A. Fuller.



[*Elliott & Fry*

Dr. W. L. Bragg

Dr. W. L. Bragg, who quite recently vacated a Midlands professorship to become director of the National Physical Laboratory, is not to remain at Teddington. He has been appointed to succeed the late Lord Rutherford at Cambridge, as professor of experimental physics and director of the Cavendish Laboratory.

Mr. W. Arbour, who has been head electrician to the Easington Coal Co., Ltd., Easington Colliery Co., Durham, has secured a position as electrical engineer under the Iraq Petroleum Co. On his departure from Easington he has been presented by his colleagues with a silver cigarette case suitably inscribed.

Sir William Bragg is to receive the first award of the new medal of the Institute of Metals for outstanding service to non-ferrous metallurgy. The presentation will take place on March 8th.

Mr. D. McLauchlan Lea has become a partner in the firm of Henry Lea & Son, consulting, mechanical, electrical and heating engineers.

Mr. G. Carrick Anderson, of the conveyor department of Mavor & Coulson, Ltd., has retired after nearly fifty years' service with the company, and on February 23rd he was presented by the staff with a grandfather clock, a wallet of notes, and a bound volume containing the signatures of the subscribers. The presentation was made by Mr. J. B. Mavor, managing director.

Mr. L. Richardson, of Hull Corporation Electricity Department, has been appointed commercial assistant with the Kingston-on-Thames electricity undertaking.

Mr. F. G. Roynon, of the Hull Corporation Electricity Department, has been appointed mains engineer with the South-East Yorkshire Light & Power Co., Ltd.

Mr. J. E. Shepherd, borough electrical engineer at Rawtenstall, who is leaving to take up the position of electrical engineer to the Barrow-in-Furness Corporation, has been presented with mementos by the staff and employés of Rawtenstall Electricity Department.

Mr. F. V. L. Mathias, borough electrical engineer, Warrington, was elected chairman of the North-West England and North Wales Area of E.D.A. at the annual meeting in Manchester on Monday last. He succeeds Mr. W. Fennell (Mid-Cheshire Electricity Supply Co., Ltd).

Mr. John C. Parker, vice-president of the Consolidated Edison Co. of New York, has been nominated for the presidency of the American Institute of Electrical Engineers. In the course of his career Mr. Parker has made outstanding contributions to the electrical and engineering industry and to education. Up to 1922 he served eight years in the teaching profession, and twelve years were devoted to engineering and executive service with the Ontario Power Co., Niagara, the Lockport & Ontario Power Co., and the Rochester Railway & Light Co. Since 1922 his interests have been centred in his affiliations, first with the Brooklyn Edison Co. as electrical engineer for four years, vice-president in charge of engineering for six years, and as president for four years and later, since 1936, with the Consolidated Edison Co., of New York, as vice-president. He was responsible for much of the design and construction of what is now the world's largest steam-electric generating station, the Hudson Avenue Station in Brooklyn, N.Y.

The following increases in salaries of the staff of the Electricity Department have been approved by the Croydon Corporation: **Mr. F. Jackson** (works superintendent), from £700 to £800; **Mr. D. MacLeod** (assistant works superintendent), from £536 to £573; **Mr. F. G. Beeby** (manager's secretary), from £450 to £500.

Sir Joseph J. Thomson, Master of Trinity College, Cambridge, has been awarded the Kelvin Medal for 1938 in recognition of the services he has rendered to engineering science. The presentation will be made by Lord Rayleigh at the Institution of Civil Engineers on May 3rd.

The Chancellor of the Duchy of Lancaster announces that he has added the name of **Mr. H. Cobden Turner** to the list of magistrates for the City of Salford. Mr. Cobden Turner is general manager of Salford Electrical Instruments, Ltd., a director of the British Ferrocart Co., Ltd., and chairman of the Meter and Instrument Section of the Institution of Electrical Engineers.

Mr. H. W. Brighten, A.M.I.Mech.E., A.M.I.E.E., has relinquished his appointment as works engineer of the Metropolitan-Vickers Electrical Co., Ltd., to take up that of assistant manager in charge of engineering activities of Kodak, Ltd.

Mr. B. Jubb, B.Sc., A.M.I.E.E., has been appointed sales manager of the Century Motor Department of Asea Electric, Ltd., at the head office at Walthamstow. Mr. Jubb has specialised in the application of fractional h.p. motors for the past seven years.

Sir John F. C. Snell, G.B.E. (honorary member, I.E.E.), will be presented with the Faraday Medal (sixteenth award) at the ordinary meeting of the Institution of Electrical Engineers to be held on March 10th. The presentation will precede the reading of a paper by Mr. W. J. Jones, M.Sc. (Eng.), on "The Lighting Load—Its Characteristics and Development."

Mr. D. B. Mirk, late radio manager of Standard Telephones and Cables, Ltd., was entertained to dinner by his colleagues at Kettner's Restaurant on February 28th, upon his resignation from the company to become a partner in the firm of Urwick Orr & Partners, consulting industrial engineers, of St. James's Square, S.W.1. Mr. T. G. Spencer, managing director of Standard Telephones & Cables, Ltd., voiced the regrets of Mr. Mirk's colleagues at his departure and wished him, on behalf of his many friends in the company, health and good fortune in his new venture, and asked his acceptance of a memento from the assembled company, which took the form of a gold cigarette case. Mr. Mirk, in reply, expressed the hope that in his new sphere he would not lose contact with his old colleagues. This meeting followed a function in the factory when the employés in the radio shop presented their former chief with a gold hunter.

Mr. D. B. Mirk

Mr. A. C. Lines, commercial assistant and senior member of the staff of the Gillingham Corporation Electricity Department, has retired on reaching the age limit. At a farewell dinner Mr. H. Hall, borough electrical engineer, on behalf of the staff, presented Mr. Lines with an inscribed barometer and a billiard cue.

Obituary

Mr. J. V. Davidson.—The death occurred at his home in Edinburgh on February 23rd of Mr. J. Val. Davidson, for many years and up to the time of his death chief of the rotating machine testplate of Bruce Peebles & Co., Ltd. Mr. Davidson served his apprenticeship with Bruce Peebles, and had a record of thirty-six years' continuous service with the company. In his position Mr. Davidson came in contact with a very large number of home and overseas engineers, and was therefore well-known in the electrical world.

Mr. T. A. Evans.—We regret to announce the death of Mr. Thomas Adam Evans, who had been a member of the board of the Dubilier Condenser Co. (1925), Ltd., for many years.

Will.—Sir Seymour B. Tritton, partner in the firm of Rendel, Palmer & Tritton, consulting engineers, left £99,957, with net personalty £97,688.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

North & Jackson, Ltd.—Private company. Registered February 25th. Capital, £2,000. Objects: To acquire the business of electrical contractors carried on by A. R. Jackson and A. E. Jackson at The Parade, Balm Road, Leeds, 10. The permanent directors are: A. E. Jackson, 37, Stainbeck Avenue, Meanwood, Leeds, 7; and A. R. Jackson, 16, Talbot Avenue, Burley, Leeds. 4.

Wester Dishwashing Machine Co., Ltd.—Private company. Registered February 25th. Capital, £1,000. Objects: To carry on business as electrical and mechanical engineers, manufacturers and vendors of clothes-wringers, clothes washing and dishwashing machines, &c. The directors are: K. R. Wester, address not stated; W. G. Laycock, Lingwood, Chipperfield, Herts; and A. M. Brown, 8, Sheldon Street, W.2. Registered office: 3, Victoria Street, S.W.1.

Fleet Electrics, Ltd.—Private company. Registered February 25th. Capital, £500. Objects: To carry on the business of dealers in, hirers, manufacturers and repairers of vacuum cleaners, sweepers, &c. The directors are: C. F. Hollamby (permanent director), 12, Elmwood Crescent, Kingsbury, Mdx: P. Hollamby, 12, Elmwood Crescent, Kingsbury, Mdx; and E. J. Greaves, 10, Hampton Court Way, Western Green, Esher. Registered office: 32 and 34, Willesden Lane, N.W.6.

Intertalk, Ltd.—Private company. Registered February 25th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in telephone, dictaphone and other office appliances, &c. The directors are: R. H. C. Sawell, 15, Vanbrugh Park Road West, Blackheath, S.E.3; and T. J. Sawell, Richmond House, 5, Northbrook Road, S.E.13. Registered office: 267, High Holborn, W.C.1.

A. C. Cossor, Ltd.—Private company. Registered February 24th. Nominal capital, £100. Objects: To carry on the business of manufacturers of and dealers in radio and television sets and apparatus, batteries, accumulators, aerials, valves, voltmeters, coils, thermionic tubes, neon and other signs, &c. The subscribers are: O. J. Hook, "Dorana," Grange Crescent, Chigwell, Essex; C. G. Lloyd, 106, Huxley Road, Leyton, E.10; and five others. Solicitors: Stephenson Harwood & Tatham, 16, Old Broad Street, E.C.

Progress Electrical Co., Ltd.—Private company. Registered February 21st. Capital, £1,000. Objects: To carry on the business of dealers in, agents for and importers, exporters, distributors and manufacturers of gramophones and sound reproducing machines, electric accumulators and batteries, wireless aerials, loud speakers and transformers, electrical, mechanical and radio engineers, &c. The subscribers are: A. Gourvish, 10, Paulton's Square, S.W.3; and J. Vanek, 50, Sterne Street, W.12.

Harries Scientific Instruments, Ltd.—Private company. Registered February 23rd. Capital, £100. Objects: To carry on the business of manufacturers of and wholesale or retail dealers in radio transmitting and receiving sets, apparatus and instruments, scientific instruments, &c. The directors are: J. H. O. Harries, 99, Church Road, Wimbledon, S.W.; and F. N. Burnett, address not stated. Registered office: 11, Waterloo Place, Pall Mall, S.W.1.

Raytel, Ltd.—Private company. Registered February 23rd. Capital, £500. Objects: To carry on the business of manufacturers, repairers and hirers of and dealers in electrical and mechanical apparatus and accessories, and in particular of radio sets and valves, &c. The directors are: H. Underwood, 10, The Green, Mountsorrel, Leics., and E. Williams, 45, St. Stephen's Road, Leicester. Registered office: 45, St. Stephen's Road, Leicester.

Thames Wire and Cable Co., Ltd.—Private company. Registered February 23rd. Capital, £5,000. Objects: To carry on the business of manufacturers of and dealers in wire and wire ropes, cables, chains, belts, cords, conductors, &c. The subscribers are: D. W. Kaye and Mrs. F. G. Kaye, both of "Martindale," Stanley Road, Enfield, Mdx. Registered office: Bell Lane, Hoddesdon, Herts.

Milnes Electrical Engineering Co. (Bingley), Ltd.—Private company. Registered February 23rd. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in radio apparatus, cabinets, loud speakers and receiving and transmission sets, mechanical and electrical engineers, electricians, packing case and box makers, &c. The subscribers are: Mrs. N. Milnes, 9, Southlands Grove, Bingley; and J. C. Suddards, 7, Ashley Road, Bingley, engineer. Registered office: Victoria Works, Church Street, Bingley, Yks.

Alexander-Rawlinson Manufacturing Co., Ltd.—Private company. Registered February 17th. Capital, £100. Objects: To carry on business as electrical, radio and general engineers, manufacturers of electric, radio and scientific apparatus, &c. The directors are: A. A. Alexander, 18, Arthur Road, Rochester, and four others. Secretary: A. L. Powell Rawlinson. Solicitors: Basset & Boucher, 125, High Street, Strood.

Ideal Electrix (Manchester), Ltd.—Private company. Registered February 17th. Capital, £500. Objects: To carry on the business of renovators, rebuilders and repairers of and dealers in vacuum cleaners and other electrical appliances, domestic and other washing and wringing machines, &c. The subscribers are: L. A. Phillips, 25, Delacourt Road, Fallowfield, Manchester; and G. L. Phillips, 11, Welbeck Avenue, Chadderton, Oldham. L. A. Phillips is a permanent director, subject to holding 250 shares. Registered office: 1, Field Street, Fallowfield, Manchester.

Shortlands, Ltd.—Private company. Registered February 14th. Capital, £500. Objects: To acquire the business of radio and electrical engineers now carried on as "Shortland & Marsh" at 2a, Devonshire Road, Broadheath, Altrincham, Ches. The directors are: E. F. Shortland and Mrs. A. Shortland, both of 2, Greenway, Oldfield, Altrincham, Ches. Registered office: 2a, Devonshire Road, Broadheath, Altrincham, Ches.

W. Geo. Hutt, Ltd.—Private company. Registered February 14th. Capital, £400. Objects: To carry on the business of electrical and mechanical engineers and contractors, electricians, motor engineers, &c. The directors are: T. E. W. Edginton, 11, Somerton Avenue, Richmond, Surrey; and Miss I. M. Claxton, 28, Sandycombe Road, Richmond, Surrey.

Neals (Music), Ltd.—Private company. Registered February 12th. Capital, £100. Objects: To acquire the business of a supplier of radio and electrical goods, gramophone records and gramophones, carried on by D. Neal, at 18, Sheffield Road, Barnsley. The directors are: M. Neal and D. Neal (permanent managing director), both of "Delmonte," Broadway, Dodworth Road, Barnsley. Registered office: 18, Sheffield Street, Barnsley.

Motor Devices, Ltd.—Private company. Registered February 12th. Capital, £100. Objects: To carry on the business of electrical engineers and contractors, suppliers of electricity, carriers of passengers and goods, manufacturers of and dealers in electrical, magnetic, galvanic and other equipment, apparatus and accessories for motor vehicles of all kinds, &c. The subscribers are: G. H. Cockin, Highgate, Haden Hill, Old Hill, Staffs, and W. Brookes Bagnall, 59, Goldthorn Crescent, Wolverhampton. Acting secretary: G. H. Cockin. Registered offices: 71, Edmund Street, Birmingham, 3.

Thermolite, Ltd.—Private company. Registered February 10th. Capital, £100. Objects: To carry on the business of merchants, warehousemen, agents, factors, importers and exporters of and wholesale and retail dealers in electrical accessories and apparatus, &c. The directors are: H. Herzog, 146, Sutherland Avenue, Maida Vale, W., and R. C. Kelt, 45, Blenheim Gardens, Cricklewood, N.W. Registered office: 1-3, Great St. Thomas Apostle (off Cannon Street), E.C.4.

Edgware Lamp Shade Co., Ltd.—Private company. Registered February 10th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in lampshades and standards of all kinds, &c. The directors are: J. Lewis, 26, Beechwood Avenue, Finchley, N.3, and L. Lyons, 50, Bridge Lane, Golders Green, N.W.11. Registered office: 25, Parkway, Stag Lane, Edgware, Middlesex.

Henry's Radio, Ltd.—Private company. Registered February 10th. Capital, £100. Objects: To carry on the business of dealers in radio, television and other instruments, &c. The subscribers are: H. Paster, 104, Station Road, Llanelly, and B. Paster, 58, Coleshill Terrace, Llanelly. Secretary: H. Paster. Registered office: 68, High Street, Swansea.

Roscoe & Co. (Halifax), Ltd.—Private company. Registered February 2nd. Capital, £120. Objects: To carry on the business of importers and exportres of and dealers in merchandise of all kinds, including metals, machinery, plant, scientific instruments, surgical, medical, curative and healing instruments and equipment, electrical, radio and television instruments, apparatus and equipment, motor car accessories and compounds, &c. The directors are: C. T. Rhodes, Ashday Hall, Southowram, Halifax; D. V. Scholes, 45, St. Aidans Road, Baildon, Yorks; and C. R. Rhodes, address not stated.

Returns of Electrical Companies

Mosbrough Electric Supply Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 9th, 1937. 3,275 shares taken up. £3,275 paid. Mortgages and charges, nil.

McGoff & Vickers, Ltd.—Capital, £2,000 in £1 shares. Return dated November 30th, 1938. 1,750 shares taken up. £1,750 paid. Mortgages and charges, nil.

J. E. Creasey, Ltd.—Capital, £500 in £1 shares. Return dated December 13th, 1937. 400 shares taken up. £400 paid. Mortgages and charges nil.

Cressall Manufacturing Co., Ltd.—Capital, £15,000 in £1 shares. Return dated November 1st, 1937. 9,000 shares taken up. £9,000 considered as paid. Mortgages and charges nil.

Cunningham Electrical & Radio, Ltd.—Capital, £1,000 in £1 shares. Return dated November 13th, 1937. 800 shares taken up. £800 paid. Mortgages and charges nil.

Read & Morris, Ltd.—Capital, £2,000 in 1,940 shares of £1 and 1,200 shares of 1s. Return dated November 10th, 1937. 1,200 1s. shares taken up. £30 paid, £30 considered as paid. Mortgages and charges nil.

Robinson & Hands Electric Co., Ltd.—Capital, £5,000 in 4,980 preference and 20 ordinary shares of £1. Return dated October 18th, 1937. 4,232 preference and 20 ordinary shares taken up. £4,252 paid. Mortgages and charges: £8,000 debenture.

Curtis Manufacturing Co., Ltd.—Capital, £6,000 in £1 shares. Return dated September 30th, 1937. All shares taken up. £1,000 paid, £5,000 considered as paid. Mortgages and charges nil.

Hornby Electrical Supplies Co., Ltd.—Capital, £20,000 in 15,000 preference shares of £1 and 100,000 deferred shares of 1s. each. Return dated October 25th, 1937. 1,100 preference and 26,000 deferred shares taken up. £2,400 paid. Mortgages and charges nil.

Price's Electrical Supplies, Ltd.—Capital, £3,000 in £1 shares. Return dated October 7th (filed December 31st), 1937. 1,210 shares taken up. £1,210 paid. Mortgages and charges, nil.

Multitone Electric Co., Ltd.—Capital, £16,000 in £1 shares. Return dated December 2nd, 1937. All shares taken up.

£11,000 paid. £5,000 considered as paid. Mortgages and charges, nil.

Wm. Clarke Electrical Contractors, Ltd.—Capital, £1,500 in £1 shares. Return dated November 3rd, 1937. All shares taken up. £750 paid. £750 considered as paid. Mortgages and charges, nil.

Cousens Radio & Electric, Ltd.—Capital, £600 in £1 shares. Return dated November 1st, 1937. 102 shares taken up. £102 paid. Mortgages and charges, nil.

Bennie Lifts, Ltd.—Debenture charged on first floor of premises No. 2, Tinworth Street, S.E.11, and the company's undertaking and other property, present and future, including uncalled capital, dated January 26th, 1938, to secure £5,000. Holders: Westminster Bank, Ltd.

Conradty Products, Ltd.—C. A. Matthews, of 60, Strand, W.C., was appointed receiver on February 16th, 1938, under powers contained in debentures dated April 15th, 1936, to January 26th, 1938.

London Power Co., Ltd.—Particulars have been filed of 3½ per cent. redeemable debenture stock (1952-72) to secure £1,500,000 authorised January 31st, 1938, and covered by trust deed dated February 11th, 1938, constituting a floating charge on the company's undertaking, assets and revenues, present and future. The whole amount is now issued. Trustees: Law Debenture Corporation, Ltd. (The stock is issued at 99 per cent. Underwriting commission 1¼ per cent. Brokerage 5s. per cent.).

Grant & Mills, Ltd.—Charge on leasehold house No. 245, Icknield Street, Birmingham, dated January 31st, 1938, to secure all moneys due or to become due from the company to the Westminster Bank, Ltd.

Universal Lighting Co., Ltd.—Particulars filed of £2.000 debentures authorised January 28th, 1938, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £1,050.

G.V.D. Illuminators, Ltd.—Capital, £20,000 in 10,000 preference shares of £1 and 40,000 ordinary shares of 5s. Return dated January 13th, 1938. All shares taken up. £12,500 paid on 10,000 preference and 10,000 ordinary shares. £7,500 considered as paid on 30,000 ordinary shares. Mortgages and charges, nil.

Ferguson Radio Corporation, Ltd.—Capital £40,000 in 34,000 ordinary shares of £1 and 120,000 founders' shares of 1s. Return dated December 15th, 1937. 24,000 ordinary and 120,000 founders' shares taken up. £30,000 paid. Mortgages and charges, nil.

Enfield Rentals, Ltd.—Capital, £100 in £1 shares. Return dated January 4th, 1938. All shares taken up. £100 paid. Mortgages and charges, nil.

Evenlite Tube Lamp Developments, Ltd.—Capital, £1,000 in 4,000 ordinary shares of 5s. Return dated December 31st, 1937. Two shares taken up. Nil called up. Mortgages and charges, nil. On January 27th, 1938, the remaining 3,998 shares were allotted for cash and fully called up.

A. C. France (Kensington), Ltd.—Capital, £100 in £1 shares. Return dated November 30th, 1937 (filed January 1st, 1938). All shares taken up. £100 paid. Mortgages and charges, nil.

Tungsten Electric Co., Ltd.—The nominal capital has been increased by the addition of £4,000 in £1 ordinary shares beyond the registered capital of £2,000.

Lightfoot Refrigeration Co., Ltd.—Satisfaction to the extent of £14,000 on January 1st, 1938, of debentures dated December 31st, 1928, and registered January 4th, 1929, securing £200,000.

Cox & Co. (R. W.), Ltd.—Mortgage on 86 & 88, Delancy Street, Camden Town, N.W., dated February 14th, 1938, to secure all moneys due or to become due from the company to Midland Bank Ltd.

Rawire, Ltd.—Henry Morgan, of 54, New Broad Street, E.C.2, was appointed receiver on February 18th, 1938, under powers contained in series of trust notes dated July 14th, 1937.

Electro-Alloys, Ltd.—Capital, £10,000 in 7,000 5 per cent. preference, 2,500 "A" ordinary, and 500 "B" ordinary shares of £1. Return dated September 14th, 1937. 2,000 preference, 2,500 "A" ordinary, and 500 "B" ordinary shares taken up. £2,000 paid on the preference shares. £3,000 considered as paid on the ordinary shares. Mortgages and charges nil.

Electric Motors Development Co., Ltd.—Capital, £25,000 in £1 shares. Return dated January 14th, 1938. 20,435 shares taken up. £5,085 paid. £15,345 considered as paid. £5 calls unpaid. Mortgages and charges nil.

Electrical Equipments (Cardiff), Ltd.—Capital, £500 in £1 shares. Return dated October 28th, 1937. All shares taken up. £430 paid. £70 considered as paid. Mortgages and charges nil.

Electrical Cleaners, Ltd.—Capital, £1,500 in 1,000 preference and 500 ordinary shares of £1. Return dated December 28th. 1937. 1,000 preference and 300 ordinary shares taken up. £1,300 paid. Mortgages and charges nil.

City Notes

The London Electric Supply Corporation, Ltd., held its annual meeting on March 1st, when Mr. G. W. Partridge, who presided in the absence, through indisposition, of the chairman, Mr. O. R. H. Bury, read the chairman's speech, in the course of which he said that the electricity sold in 1937 totalled 379 million kWh, as compared with 367 million kWh in the previous year. The number of new connections during the year was 2,538, and their load was the equivalent of 7,548 h.p. They paid approximately £39,000 more to the London Power Co. for electricity. The cost per kWh was higher, which was attributable to the rise in the price of coal. The length of mains laid during the year was approximately 36 miles, bringing the total mileage of mains laid to 407. Last year a scheme which they submitted for lighting all the streets in the borough of Deptford by electric-discharge lamps was accepted by the Deptford Council. Owing to the steel shortage, concrete columns were decided upon. The streets to be so lighted had a mileage of fifty-four and would entail an extensive mains laying programme during the next two years. On completion of the scheme electricity would be available for every house in Deptford. Their showrooms in Lewisham High Road served only one portion of their area and negotiations were in progress for acquiring premises which would be opened during the current year. In August last year they completed the fiftieth year of their existence, and it was interesting to note the progress which had been made since the days when they commenced to supply. They were of opinion that the use of electricity would continue to expand, as there were many fields still remaining to be developed, some of them on a large scale. There were numerous processes in works and factories which could be replaced by electrical methods, and large buildings would be heated by electrical methods and be equipped with air-conditioning and ventilating plants. The future would see a great development as and when the efficiency of apparatus for those purposes was recognised.

The Bournemouth and Poole Electricity Supply Co., Ltd., is paying a final dividend of 9 per cent., maintaining the distribution for the year at 15 per cent., less tax.

The Metropolitan Electric Supply Co., Ltd., proposes to pay a final dividend of 7 per cent., plus a bonus of 2 per cent., less tax, on the ordinary shares numbered 1 to 2,650,000, and a final dividend of 7 per cent., plus a bonus of 2 per cent., on the shares numbered 2,650,001 to 3,000,000. The latter payment is to be calculated on 2s. 6d. per share paid from the date of allotment, June 1st to December 31st, 1937, and on 17s. 6d. per share paid from due date of instalment, July 12th to December 31st. These dividends make a total distribution of 12 per cent., less tax. In the previous year the dividend was 10 per cent. on the original capital of £2,650,000, and a special bonus of 2½ per cent., tax free, was distributed to mark the jubilee year of the company.

J. & F. Stone Lighting & Radio, Ltd., have announced an interim ordinary dividend of 5 per cent., less tax (against 6 per cent.).

The Notting Hill Electric Lighting Co., Ltd.—Presiding at the annual meeting on March 1st Mr. G. Balfour (chairman) said since the control of the company had been taken over about two years ago by the Metropolitan Electric Supply Co. £100,000 had been spent in improving the system by means of additional three-phase a.c. distribution. They were pressing forward with the development on these lines and hoped in the course of the next year or two to have dealt with the whole of the area in so far as it was practicable. Up to the present they had changed over 4,000 kW of load from d.c. to a.c. Last year they had to face unusual expenditure amounting to nearly £13,000 in changing over apparatus and compensation to redundant staff. Notwithstanding this, they reduced prices and were making a further substantial reduction this year. Since the standard all-in tariff for domestic and business premises had been introduced 4,000 consumers had adopted this method of charge. As from the end of June reductions would be made in the kW charge to business premises, and in the fixed charge on the domestic all-in tariff. The "unit" rate for domestic charge would be reduced from ¾d. to ½d. and meter rents would be reduced by approximately one-third.

Mather & Platt, Ltd.—Presiding at the annual meeting on February 23rd Mr. L. E. Mather (chairman), said that all departments had been fully occupied during the year under review. Comparing the position with the previous year they could record a further increase in home orders which had been spread over all departments. Their electrical and pump departments had experienced a record year in output. As regards overseas contracts, there had been a welcome increase taking all territories together, and the percentage in the total turnover had risen from 30 to 40 per cent. India, their largest individual market, had continued to improve and was responsible for a good deal of the general overseas increase. South America had also been more productive during the year. From Soviet Russia they had practically no direct business, though they had supplied a certain amount of electrical and pumping plant machinery to firms with contracts for that country. In connection with fire protection their armoured doors and shutters were meeting with increasing success, the latter being often supplied for electrical operation with their own motors. As regards prospects, their order book on January 1st was over 50 per cent. greater than that with which they started 1937, and although there had been a slight diminution in inquiries during the last two months they did not anticipate much contraction.

The Midland Counties Electric Supply Co., Ltd., reports that the trading profits for 1937 of the undertakings owned and operated by it, after payment of tax, amounted to £767,352, as compared with £664,703 in the preceding year. The gross revenue of the parent company is £391,733 (against £355.281), and the net revenue £332,390 (£303,283). The ordinary dividend for the year is maintained at 8 per cent., less tax, reserve receives £37,125, and £14,993 is carried forward (against £11,647 brought in). The report states that additional plant was brought into operation at Spondon power station during the year, and the transmission and distribution systems were further extended to meet the continuing growth of power and lighting business. The company acquired all the ordinary shares and the majority of the preference shares of the Tamworth District Electric Supply Co., and the whole of the capital of the Mansfield District Traction Co. An issue of 1,000,000 4½ per cent. preference shares was made, which was subsequently converted into stock. Meeting: March 7th.

Clarke, Chapman & Co., Ltd., report net profits of £77,228 for 1937, as compared with £53,867 in the preceding year. These figures are struck after providing for all charges and taxation and allowing £13,609 (against £12,946) for depreciation. The ordinary dividend for the year is 10 per cent. (against 8 per cent.), reserve receives £20,000, and £18,889 is carried forward (against £13,207 brought in).

The Northampton Electric Light & Power Co., Ltd., reports a net revenue of £138,564 for 1937, as compared with £116,872 in the preceding year, after providing £109,723 for depreciation. To this is added income from investments (£7,045) and the

balance brought in (£18,445), making £164,054. After deducting debenture interest, &c., and placing £20,000 to general reserve, it is proposed to pay a final ordinary dividend of 6 per cent., maintaining the distribution for the year at 10 per cent., and to carry forward £26,656. In October £100,000 3½ per cent. debenture stock was issued to rank *pari passu* with the £500,000 stock previously issued. The total number of kWh sent out from the power station and sold to the Central Electricity Board was 140,593,940, an increase of 21 per cent. Sales to the company's own consumers and in bulk to its associated companies amounted to 85,536,162 kWh, an increase of 13 per cent. The maximum load on the system was 33,820 kW. Following the annual meeting to-day (Friday) resolutions will be submitted for converting the share capital into preference and ordinary stock.

The Rushden and District Electric Supply Co., Ltd., reports a profit for 1937 of £14,172, as compared with £10,672 for 1936. It is proposed to pay a final dividend of 5½ per cent., making 9 per cent. for the year (against 8 per cent.), and to carry forward £4,017 (against £2,724 brought in). The sales of electricity increased by over 11 per cent. to 8,458,009 kWh.

Waygood-Otis, Ltd.—Presiding at the annual meeting on February 22nd Mr. D. W. R. Green (chairman) said that during the year there had been no falling off in production, and the amount of their uncompleted orders was maintained at the standard of previous years. All departments, new sales of both lifts and escalators as well as repairs and maintenance work, had contributed to their large turnover. Orders recently received included lifts at Berkeley Square House, the new Adelphi and the new office buildings for the London County Council. An outstanding feature of the Empire Exhibition, Glasgow, would be a steel observation tower in which their gearless machines travelling at 500 ft. per minute would be installed. They had also been entrusted with the lifts for the new Cunarder *Queen Elizabeth*. Their export business continued to bring orders on the level of recent years, all territories showing satisfactory results. Service repair and maintenance work continued to grow, and it was interesting to note the increasing number of customers who had found it advantageous to avail themselves of their full maintenance contracts.

Enfield Cable Works, Ltd., reports a net profit for the year ended December 31st of £181,203, as compared with £209,831 in the preceding year, to which is added £14,737 brought in, making £195,940. It is proposed to place £25,000 to reserve, and £12,000 to taxation reserve (including N.D.C.), and to pay a final ordinary dividend of 15 per cent., making 25 per cent. for the year (same). This leaves £18,940 to be carried forward. The net profits are lower than in the previous year, but the report states that the decrease is accounted for by reduction in prices of the company's products, and not by reduction of turnover. The directors propose that £150,000, part of the undivided profits standing to the credit of reserve, shall be capitalised and distributed by way of bonus to the ordinary shareholders in the proportion of three new ordinary shares for every five shares held. This capitalisation of profits will alter the percentage rate of dividend distributable in future years. Meeting: March 23rd.

Hall Telephone Accessories (1928), Ltd., reports net profits for the year ended December 31st of £73,735, as compared with £75,928 in the preceding year. Income tax and N.D.C. receive £20,000, dividend equalisation reserve £10,000, patent reserve £6,000, and directors' additional remuneration £4,148. The final dividend is 5 per cent. (same), plus a bonus of 5 per cent. (against 6 per cent.), making a total distribution for the year of 15 per cent., and £12,069 is carried forward (against £11,746 brought in). In the previous year the distribution was 16 per cent., but was paid on smaller capital. The directors state that the present volume of work is larger than in any previous year, and all of it is against contracts. The building of the new factory at Dowlais by the Special Areas Commissioners has been slower than was originally anticipated, but production began there last month. Meeting: March 3rd.

Pye (Ireland), Ltd., held its annual meeting on February 23rd when Mr. C. O. Stanley (chairman), who presided, said that the trading profit achieved in the first year of their undertaking was £9,675. As managing director of their English associate he could state that for the first nine months' trading the profit figures of that company compared favourably with the same period of trading in the previous year. The English company had extended its activities into the electrical industry and was now completing the manufacturing arrangements for certain electrical appliances. It would be the endeavour of the directors of that company to pass on to their company in Dublin whatever advantages might result from the present negotiations.

The Mid-Southern Utility Co. held its annual meeting on February 24th when Mr. T. A. Braddock (chairman), who presided, said that the net increase in sales of electricity was 40.5 per cent. as compared with 1936. Additional appliances increased the load by 19,090 kW as compared with 19,819 kW for the previous year. With regard to the Electricity Distribution Bill, by the rapid expansion of recent years they had earned the right to be considered as one of the most progressive provincial undertakings, especially in the rational development of the rural areas.

A. C. Cossor, Ltd.—The lists were to open and close yesterday (Thursday) in an offer for sale by the Ridgeford Trust of preference and ordinary shares in A. C. Cossor, Ltd. The capital is £1,000,000 in 500,000 £1 6 per cent. cumulative preference shares and 2,000,000 5s. ordinary shares. The offer comprises the whole of the preference shares at 20s. 6d. and 1,000,000 of the ordinary shares at 7s. 6d.

The Bristol Tramways & Carriage Co., Ltd., reports a profit of £164,978 for 1937 after providing for debenture interest, &c., to which is added £15,555 brought in, making £180,534. The final ordinary dividend is 5 per cent., making 8 per cent. for the year, less tax. £15,000 is placed to reserve for contingencies and renewals, and £21,509 is carried forward. An agreement was reached in May last for the transfer to the Bristol Corporation of the tramway and light railway undertaking, for the abandonment of tramways and light railways and for the provision and joint working of stage and express carriages. The arrangements became operative on October 1st, and these services, together with the city omnibus services of the company, are now operated under the management of the company with a joint committee of representatives of the company and the Corporation, the net revenue being divided equally between the two parties.

The Ransome & Marles Bearing Co., Ltd., is to pay an interim dividend of 9 per cent., less tax, on the £700,000 ordinary stock, as increased during 1937. In the year ended June 30th last an interim of 7½ per cent. was followed by a final dividend of 12½ per cent. and a capital bonus of 25 per cent. In November last the balance of the authorised capital (£75,000) was offered to stockholders.

The North Metropolitan Electric Power Supply Co. proposes to pay a final dividend upon the ordinary stock of 6 per cent., making 10 per cent. for the year (same). A sum of £374,082 is to be placed to depreciation and reserve and £30,000 to contingency account. The balance carried forward is £74,367 (against £63,665 brought in).

Bruce Peebles & Co., Ltd., have announced the fixed preference dividend of 7½ per cent. for 1937 and a further participating payment of 2½ per cent. The 5 per cent. dividend on the ordinary shares is the first ordinary payment since 1929.

Waste Heat & Gas Electrical Generating Stations, Ltd., has declared a final dividend of 5½ per cent., making 8 per cent. for the year (unchanged).

The London Associated Electricity Undertakings, Ltd., is paying a final dividend of 4 per cent. less tax making 7 per cent. for the year (same).

The Scottish Power Co. Ltd., has declared a final dividend of 5½ per cent. maintaining the distribution for the year at 8 per cent.

The North-Eastern Electric Supply Co., Ltd., has declared a final dividend of 4½ per cent., less tax, making 7 per cent. for the year (same).

The Newcastle & District Electric Lighting Co., Ltd., is paying a dividend of 7 per cent. on the ordinary shares for 1937 (unchanged).

The Mid-Cheshire Electricity Supply Co., Ltd., is paying a dividend of 8 per cent. for the year. A similar distribution was made in 1936, but the present dividend is on larger capital.

Ward & Goldstone, Ltd., announce the usual final dividend for the year on the cumulative preference shares at the rate of 7 per cent. per annum.

The Llanelly and District Electric Supply Co., Ltd., has declared a dividend of 5½ per cent. for the year. This is at the same rate as for 1936, but is being paid on larger capital.

The Richmond (Surrey) Electric Light & Power Co., Ltd., has declared a final dividend of 4 per cent., making 7 per cent., less tax, for the year (unchanged).

The Kent Electric Power Co. has announced a dividend of 8 per cent., less tax, for the year.

Worthington-Simpson, Ltd., is paying a dividend of 7 per cent. for the year, less tax (same).

The Globe Telegraph & Trust Co., Ltd., is paying a quarterly dividend of 2s. 6d. per £10 share net.

The Mersey Power Co., Ltd., is paying a dividend of 8 per cent., less tax, for 1937 (against 7½ per cent.).

Stocks and Shares

TUESDAY EVENING.

THE volume of business in Stock Exchange markets has dwindled to meagre proportions. Politics are blamed as the chief contributory cause to the caution exhibited by investor and speculator alike, so far as dealing in stocks and shares is concerned. Notwithstanding the continued, and continual, assurance from authoritative quarters, that trade throughout the country is satisfactory, there is a pronounced disposition to wait upon the course of events, rather than to take advantage of the fairly widespread fall in prices that has occurred, and which has reduced quotations to levels at which a good many sound industrials, for instance, give a return ranging from 4½ to 5 per cent. on the money.

Relations in America between the Administration at Washington and the Big Business Barons, as Mr. Roosevelt would call them, are still strained. This, in itself, adds to the uncertainty felt in regard to what is likely to happen in the United States. Gilt-edged stocks remain amongst the steadiest in the lists. Central Electricity and London Electric Transport issues have gained a point in several cases.

Enfield Cables

Declaration of a dividend by the Enfield Cable Works, making 25 per cent. for the year, the same as before, accorded with advance estimates. The market was unprepared, however, for the simultaneous announcement of a bonus of 60 per cent. in shares. The price rose from 4⅞ to 5½ and lively curiosity was felt in the issue of the company's report and accounts. These, when they appeared, provided another surprise, but of a different order. Instead of the profits being higher than those for the corresponding period, both gross and net were disappointingly down.

The price of the shares came back to 4¾, at which it shows a small loss on the week. Instead of there being a profit on the sale of investments, as in 1936, there was a loss on this item in 1937, and the percentage of the company's earnings on its ordinary shares for the latter year is well below that for 1936. The chairman's speech at the meeting is awaited with more than usual interest.

Equipment and Manufacturing Shares

Prices of cable manufacturing shares were brightened for a time by reflected glory from the Enfield Company's bonus announcement, but faded later. Callenders held a rise from 4 3/16 to 4 3/8; British Insulated came back to 4½ after being 4 5/16. Telegraph Constructions, at 40s., have recovered part of the relapse which followed the recent dividend declaration. Other shares in the electrical equipment group were to the fore in last week's partial recovery in industrial markets. General Electrics at 72s., and Associated Electricals at 41s., retain only 6d. of more substantial earlier gains. Firmness in Crompton Parkinsons, at 26s. 3d., is probably assisted by a cessation of sales of allotment letters—now due for registration—in respect of last year's bonus issue. Crabtree Electricals have put on 1s. to 27s. 6d. Others to show improvement are Walsall Conduits, now 24s. 6d., Westinghouse Brakes, which have risen 3s. 9d. to 56s., Automatic Telephones at 40s. 3d., and Enfield Rolling Mills. The last mentioned rose from 11s. 6d. to 13s. before reacting to 12s. 3d.

Hall Telephone Profits

Hall Telephone Accessories have lately declared a final dividend and cash bonus making 15 per cent. for the year. For 1936 the distribution was 16 per cent. on the capital as it stood before last July's issue of new shares at the rate of one, at 11s., for every three old shares held. The accounts now published show net profits to be rather lower than before, but the dividend to be comfortably covered by earnings. From the report it appears that the new capital, having been translated into extra plant, is now ready to pull its weight in dealing with what is said to be a growing volume of work. Being in line with previous expectations, the results have had little quotable effect on the price of the shares at 23s. ex dividend. The yield works out at approximately 6½ per cent. on the money.

Preference Shares on Offer

A round 5 per cent. is the return on Electric Construction 7 per cent. cumulative preference shares, of which a line is at present on offer at a price of 28s., free of stamp duty. The offer is made subject to permission to deal being granted by the Stock Exchange Committee. Payment for the shares is due at the end of March; a full half-year's dividend will be paid in November. In the past three years, net profits of the company have been multiplied about 2½ times, the last three dividends on the ordinary shares being 3½ per cent., 7 per cent. and 10 per cent. (for 1937). The preference dividend is covered by profits with a comfortably wide margin. The last-published profits were sufficient to meet this charge about nine times over.

Miscellaneous Matters

Activity in Cable and Wireless stocks has slackened. There is an idea that some time may yet have to elapse before agreement is reached in the negotiations understood to be in progress between the combine and the Empire Governments. After minor fluctuations, the price of the ordinary stock, at 66, is a point lower on the week. London Transport "C" stock at 83½ is 1½ points harder, the better tendency resting mainly on the opinion expressed at the Tillings annual meeting that a full 5½ per cent. dividend may reasonably be expected this year. Tillings at 57s. 3d. and British Electric Traction deferred at 962, are both higher. In the electricity supply market, prices maintain all their stability. British Power and Light have further advanced to 28s. 6d., ex the good dividend, making 7 per cent. for the year; the yield of £4 18s. 3d. per cent. is noticeably better than the average of the group. Atlas Electrics have moved up during the past week or so from 3s. 9d. to 4s. 6d.

The Oxford City Council has decided to promote a Parliamentary Bill to secure necessary powers to purchase the Oxford Electric Company's undertaking. This is the latest step in developments which led to the Wessex Electricity Company offering 38s. for Oxford Electric ordinary shares, and a further bid of 43s. for the same shares by the Oxford Corporation. Among the few industrial issues being made at the present time is an offer this week by the Cossor Company of 6 per cent. preference shares at 20s. 6d., and 5s. ordinary shares at 7s. 6d.

The Pace of Business

Upon the execution of an order a Stock Exchange broker may, if he chooses, have the price at which he dealt recorded in the daily "Official" or "Unofficial" list of quotations, which are reproduced in several of the daily papers. From the total number of these "markings"—as they are called—recorded each day, some idea can be obtained as to the activity of markets. The total does not represent by any means the total number of bargains done, since marking is an optional matter. The number of shares, moreover, is not specified. Nevertheless, these markings serve as a rough and ready indication of the quietude of present markets. The present daily total is round about 7,000 bargains, whereas a year ago the figure was varying between 11,500 and 15,000 per diem. By the more statistically minded Americans, such figures are given high importance. Not only is the marking of bargains compulsory in the New York Stock Exchange, but the number of shares changing hands, as well as the price, must immediately be recorded. Hourly reports on the volume of the business passing are closely watched for a clue to the direction in which prices may next turn.

Share List of Electrical Companies

	Dividend. Nom.	Previous.	Last.	Price Mar. 1.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/–	—	4 8 3
Clyde Valley	1	7	8	41/–	—	3 18 1
County of London	1	10½	10½	50/6	–	4 3 4
Edmundson's 7% Pref.	1	7	7	32/6	—	4 6 2
Do. Ord.	1	8	9	38/–	—	4 14 9
Elec. Dis. Yorkshire	1	9	9	42/–	–	4 5 10
Elec. Fin. and Securities	1	12½	12½	51/3	—	4 17 6
Elec. Supply Corporation	1	11	12	52/6	—	4 11 5
Lancs Light and Power	1	7½	7½	35/–	—	4 5 9
Lond. Assoc. Electric	1	—	7	32/–	—	4 7 6
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red.	Stock	5	5	106	—	4 14 4
Metropolitan	1	10	10	46/–	—	4 7 0
Midland Counties	1	7½	8	37/6	—	4 5 0
Mid. Elec. Power	1	8	9	2 1/16	—	4 7 4
North Eastern Electric Ordinary	1	6	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	33/–	—	4 4 10
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	48/9	—	4 2 0
Do. do. 6% Pref.	1	6	6	30/–	—	4 0 0
Scottish Power	1	8	8	37/6	—	4 5 4
South London	1	7	7	32/6	—	4 6 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/–	—	7 2 10
Yorkshire Elec.	1	8	8	40/–	—	4 0 0
PUBLIC BOARDS						
Central Electricity, 1950–70	Stock	5	5	113	—	4 8 6
Do. 1955–75	„	5	5	118	+1	4 4 9
Do. 1951–73	„	4½	4½	111	—	4 1 1
Do. 1963–93	„	—	3½	100	—	3 10 0
London Elec. Trans. Gtd.	„	—	2½	92	+1	2 14 4
London & Home Counties, 1955–75	„	4½	4½	112	—	4 0 4
London Passenger Transport, A	„	—	4½	118½	—	3 16 3
Do. do. B	„	—	5	121½	—	4 2 4
Do. do. C	„	4	4½	83½	+1½	5 1 10
West Midlands Joint Elec. 1948–68	„	—	5	115	—	4 7 0
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	137½	—	6 11 0
Anglo-Am. Tel. Pref.	Stock	6	6	111½	—	5 7 7
Do. Def.	„	1½	1½	27	—	5 11 3
Cable & Wireless 5½% Pref.	„	4½	5½	103	—	5 6 10
Do. Ord.	„	—	—	66	–1	—
Do. Income	„	—	—	102½	–1	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	14½	—	3 14 9
Do. do. Pref.	10	6	6	13½	—	4 7 3
Great Northern Tel.	10	20	20	39½	—	5 1 3
Marconi-Marine	1	10	7½	28/9	—	5 4 4
Oriental Telephone Ord.	1	12*	12*	2 1/16	—	4 9 3
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	7/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	+ 1/16	—
Do. do. 5% Deb.	Stock	Nil	Nil	18½	—	—
British Electric Traction Def. Ord.	„	5	5	962	+25	—
Do. do. Pref. Ord.	„	8	8	100	—	4 17 0
Brazil Traction	$100	70 cts.	$1	11	—½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—1	4 17 9
Mexican Light Common	$100	Nil	Nil	1½	—	—
Do. 1st Bonds	$500	5	5	35	—	—
Victoria Falls Ord.	1	20	12	3	—	4 0 0
West Riding	1	6½	10	2	—	5 0 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1½	—	8 0 0
Assoc. Elec. Ord.	1	8	10	41/–	+6d.	4 7 9
Do Pref.	1	8	8	38/–	—	4 4 6
Babcock & Wilcox	1	8	10	42/9	+9d.	4 14 3
British Aluminium Ord.	1	7½	10	45/9	+2/–	4 7 4
British Insulated Ord.	Stock	20	20	4½	–	4 9 0
Brush Ord.	Stock	Nil	Nil	21½	—	—
Callender's	1	15	15	4 3/8	+ 1/16	3 8 5
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	26/3	+ 1/16	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	36/3	+ 1/16	5 10 6
Enfield Cable Ord.	1	25	25	4 3/8	– 1/16	5 5 3
English Electric	1	Nil	10	31/–	+1/–	6 9 4
Do. do. Pref.	1	6½*	6½	25/6	—	5 2 0
Ericsson Tel.	5/–	20	25*	1½	–	3 6 7
Ever Ready	5/–	35	45	26/–	—	8 13 2
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	72/–	+6d.	4 17 4
Henley's	5/–	30	15	18/9	—9d.	4 0 0
Do. 4½% Pref.	1	4½	4½	1½xd.	—	4 0 0
India-Rubber Pref.	1	5½	5½	22/–	—	5 0 0
Johnson & Phillips	1	½	10	38/9	–	5 3 1
Lancashire Dynamo	1	10	20	3 1/16	+ 1/16	6 0 10
Siemens Ord.	1	6	7½	28/9	—	5 4 4
Telegraph Construction	£1	7½	10	38/9xd.	+ 1/16	5 0 0

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1936

11932. "Supplying a single-phase load from a three-phase supply." Soc. Savoisienne de Constructions Electriques. May 2nd, 1935. (479112.)

12118. "Thermionic-valve circuits, particularly for use in television." A. D. Blumlein. April 29th, 1936. (479113.)

12300. "Arrangement for starting induction motors with short-circuited rotors." K. Obermoser. April 30th, 1935. (Cognate application 12301/36.) (479115.)

15149. "Aerial coupling devices." F. R. W. Strafford, O. S. Higher and Belling & Lee, Ltd. May 29th, 1936. (479118.)

15428. "Machines for automatically securing plug sockets or the like to such articles as the zinc cans of electric batteries." E. Kleinmann and A. Mendel (trading as Kleinmann, Geb.). June 2nd, 1936. (479281.)

20985. "Speed control of electrical machines." British Thomson-Houston Co., Ltd., and R. D. Given. July 29th, 1936. (479285.)

21200. "Electrical remote-control apparatus." A. H. Whiteley. July 31st, 1936. (479431.)

21249. "Miners' safety and other electric battery lamps." Oldham & Son, Ltd., and T. G. Mair. July 31st, 1936. (479197.)

21256. "Plug-and-socket electric connectors." H. Stokes. July 31st, 1936. (479289.)

21297. "Telephone apparatus employing loudspeaking equipment." Telephone Manufacturing Co., Ltd., J. G. Flint and L. E. Lyall. July 31st, 1936. (479354.)

21330. "Cathode-ray tubes." J. W. Strange and W. H. Connell. August 1st, 1936. (479356.)

21370. "Electric-lighting sets for cycles." W. J. Hill. August 1st, 1936. (479435.)

21452. "Television scanning means according to the interlaced line-group method." Radioakt.-Ges. D. S. Loewe. August 6th, 1935. (479500.)

21487. "Valve amplifying and detecting circuits." G. W. Johnson (Philco Radio & Television Corporation.) August 4th, 1936. (479440.)

21676. "Electric lampholders and reflectors." Curtis Lighting Co. of Great Britain, Ltd., and W. E. Bush. August 6th, 1936. (479454.)

21701. "Television and like systems." Baird Television, Ltd., T. M. C. Lance and B. B. Austin. August 6th, 1936. (479458.)

21710. "Electric immersion heaters." General Electric Co., Ltd., and C. W. Stopford. August 6th, 1936. (479361.)

21720/1. "Galvanic elements." A. Carpmael (I. G. Farbenindustrie Akt.-Ges.). August 6th, 1936. (479462/502.)

21814. "Alternating-current signalling systems and apparatus therefore." Standard Telephones & Cables, Ltd., and V. J. Terry. August 7th, 1936. (479468.)

21822. "Microphones." Automatic Electric Co., Ltd. (in liquidation). September 16th, 1935. (479469.)

21860. "Cathode-ray tubes." Fernseh Akt.-Ges. August 7th, 1935. (479471.)

22248. "Modulated carrier wave radio and like transmitters." Telefunken Ges für Drahtlose Telegraphie. April 12th, 1935. (Cognate applications 22249/36, 22250/36, 22251/36 and 22252/36). (479302.)

22301. "Electrical condensers." P. A. Sporing and Telegraph Condenser Co., Ltd. August 13th, 1936. (479303.)

22441. "Oscillation generator for television." Radioakt.-Ges. D. S. Loewe. August 22nd, 1935. (479139.)

22442. "Television." Radioakt.-Ges. D. S. Loewe. August 19th, 1935. (479305.)

23328. "Electric-discharge devices comprising an evacuated envelope containing a luminescent screen." General Electric Co., Ltd. (Patent Treuhand Ges. für Elektrische Glühlampen.) August 26th, 1936. (Cognate application 24137/36.) (479306.)

23393. "Lamps for street lighting and the like." Foster & Pullen, Ltd., H. R. Stevenson and D. G. Woolfenden. August 26th, 1936. (479307.)

23997. "Retractive electric switches." T. Whitaker and J. Whitaker. September 2nd, 1936. (479308.)

25520. "Methods of operating three-phase alternating-current motors from single-phase supplies." British Thomson-Houston Co., Ltd., and A. H. Maggs. September 19th, 1936. (479309.)

25822. "Arrangement for adjusting the image when the cathode ray is deflected statically, and for stabilising the same, especially for television purposes." E. Michaelis. September 23rd, 1936. (479149.)

26415. "Joints for electric cables." Callender's Cable & Construction Co., Ltd., E. Tunnicliff, K. S. Brazier and L. G. Brazier. September 29th, 1936. (479150.)

26446. "High-tension cartridge and like fuses." Electric Transmission, Ltd., and K. Dannenberg. September 29th, 1936. (Cognate application 12770/37.) (479211.)

27746. "X-ray apparatus." F. M. Cowper and Amalgamated Dental Co., Ltd. October 13th, 1936. (479154.)

28425. "Welding electrodes." T. C. R. Shepherd and Metropolitan-Vickers Electrical Co., Ltd. October 19th, 1936. (479376.)

29155. "Reflectors for use with mercury-vapour discharge and other lamps." G. D. Skinner and Benjamin Electric, Ltd. October 27th, 1936. (479220.)

29692. "Thermally operated electric switches for fire-protection apparatus." National Fire Protection Co., Ltd., and C. B. Sanders. November 2nd, 1936. (479221.)

30271. "Electric-discharge rectifiers." General Electric Co., Ltd., and D. G. Prinz. November 6th, 1936. (479155.)

30926. "Squirrel-cage electric windings." General Electric Co., Ltd., and A. T. Bartlett. November 12th, 1936. (479225.)

30959. "Cathode-ray tubes." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. November 15th, 1935. (479226.)

31483. "Resistance controllers for electric motors." British Thomson-Houston Co., Ltd. November 18th, 1935. (479384.)

32678. "Electric signalling cables with electrostatic screens." Felten & Guilleaume Carlswerk Akt.-Ges. December 3rd, 1935. (479481.)

33429. "Electric motor control systems for electric winding-gear." Kolar Mines Power Station, Ltd., and H. Freeman. December 5th, 1936. (Cognate application 18332/37.) (479313.)

33807. "Spark-plugs'.' General Motors Corporation. December 9th, 1935. (479158.)

34600. "Circuit arrangements for telegraphic selector installations." Siemens & Halske Akt.-Ges. December 16th, 1935. (Cognate applications 34601/36 and 34602/36.) (479314.)

35869. "Electric controllers." W. T. Gray, and Metropolitan Vickers Electrical Co., Ltd. December 31st, 1936. (479315.)

1937

191. "Circuit arrangements employing thermionic amplifiers for controlling the volume range of signals." C. E. P. Jones. August 5th, 1936. (Cognate application 1293/37.) (Divided out of 19299/35 and 20597/35.) (479388.)

2781. "Potter-Bucky diaphragms for X-ray photography." British Thomson-Houston Co., Ltd. January 31st, 1936. (479389.)

3024. "Separators for electric accumulators and the like." Chloride Electrical Storage Co., Ltd. March 7th, 1936. (479390.)

5820. "Electric condensers." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). February 26th, 1937. (479392.)

6014. "Apparatus for electrical precipitation of suspended particles from gases." Lodge-Cottrell, Ltd., and L. Lodge. March 1st, 1937. (479164.)

6182. "Incandescent image-screen for cathode-ray tubes." Farnsworth Television, Inc. March 9th, 1936. (479318.)

7102. "Electric transformers." British Thomson-Houston Co., Ltd. March 10th, 1936. (479394.)

7771. "Housings for apparatus employed in submarine-cable systems." Electrical Research Products, Inc. March 28th, 1936. (479170.)

8389. "Electric-discharge devices." British Thomson-Houston Co., Ltd. March 21st, 1936. (479396.)

9675. "Metal-clad electric-current convertors." Siemens-Schuckertwerke Akt.-Ges. May 16th, 1936. (479321.)

10514. "Electrolytic condensers." British Thomson-Houston Co., Ltd. April 14th, 1936. (479401.)

12747. "Small self-starting synchronous motors." R. H. Whitehead. May 4th, 1937. (479178.)

15581. "Electric circuit-breakers having arc-extinguishing devices." Westinghouse Electric & Manufacturing Co. June 5th, 1936. (479412.)

15738. "Means for regulating the voltage of asynchronous generators, and the excitation and control of synchronous generators." British Thomson-Houston Co., Ltd. June 6th, 1936. (479260.)

15877. "Tele-cinematograph transmitters." Telefunken Ges. für Drahtlose Telegraphie. June 8th, 1936. (479413.)

16550. "Sound-translating devices." Electrical Research Products, Inc. June 18th, 1936. (479328.)

16749. "Electrical devices for determining the degree of vacuum in vacuum insulations." Aktiebolaget Termisk Isolation. June 22nd, 1936. (479184.)

17936. "Electrical welding apparatus." Daimler-Benz Akt.-Ges. June 6th, 1936. (479185.)

18057. "Contact device for electric torches." Elektrotechnische Fabrik Schmidt & Co. Ges. June 30th, 1936. (Cognate application 18058/37.) (479417.)

19109. "Cathode-ray tubes." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. November 12th. 1936. (Divided out of and addition to 479226.) (479270.)

19738. "Directional wireless antennae." C. Lorenz Akt.-Ges. July 18th, 1936. (479330.)

21632. "Electron-optical reproduction." British Thomson-Houston Co., Ltd. August 5th, 1936. (479420.)

22900. "Protective systems for direct-current circuits." British Thomson-Houston Co., Ltd. August 20th. 1936. (479333.)

23176. "Thermionic amplifiers for wide signal bands at intermediate frequencies." E. Michaelis. August 28th, 1936. (479421.)

24298. "Electric oscillation generators." C. L. Faudel and E. L. C. White. May 1st. 1936. (Divided out of 471737.) (Cognate application 14196/36.) (479275.)

25640. "Electric-discharge lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 24th, 1936. (479424.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 23rd:—

Federal (lettering and design). No. 579280. Class 6. Welding machines, &c., and parts thereof.—The British Federal & Machine Co., Ltd., Castle Mill Works, Dudley, Worcestershire.

Trophy. No. 582732. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—British Television Supplies, Ltd., Faraday House, 8-10, Charing Cross Road, W.C.2.

C.M.A., Certification Mark (lettering and design). No. 566585. Class 8. Electric cables. No. 566586. Class 39. Electric wire covered with paper. No. 566587. Class 40. Electric wire covered with indiarubber.—The Cable Makers' Association, Sardinia House, Sardinia Street, W.C.2.

Hes. No. 583001. Class 13. Electric incandescent lamps (ordinary).—F. H. Worsley, 111, Gray's Inn Road. W.C.1.

Silodite. No. 582879. All goods in Class 40.—The India Rubber, Gutta Percha and Telegraph Works Co., Ltd., Thames House, Millbank, Westminster, S.W.1.

Lutralite. No. 582870. Class 50. Thermoplastic or thermo-setting plastic moulding materials, all having a basis of synthetic resin, cellulose derivatives, cellulose acetate, celluloid, casein, natural resins or bitumen, polymerised vinyl ester or other alkyl ester of acrylic acid or its homologues and fibre, and articles made therefrom.—Twinco, Ltd., Leominster Works, Lower Essex Street, Birmingham.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arnold.—Houses (50) Coppice Road estate; U.D.C. surveyor.

Aylesbury.—Garage, offices, &c., Buckingham Street; Eastern National Omnibus Co.

Barkingside.—School, Girls' Village Home (£20,000); Dr. Barnado's trustees.

Bedwellty.—Houses (118), Pengam and Blackwood; U.D.C. surveyor, Aberbargoed.

Beeston (NOTTS).—Cinema, for Majestic Cinemas, Ltd.

Beverley.—Houses (46), Mill Lane estate; Whiteing and Reynolds, chartered architects, 3, Ladygate.

Birmingham.—Schools, Bristol Road, for the governors of King Edward's School; J. R. Decon, Lichfield, Staffordshire. Factory and offices, Coleshill Street; C. Bryant & Son, builders, Small Heath.

Bishop Auckland.—Factories (30 acres estate), for North-Eastern Trading Estates, Ltd., Newcastle-on-Tyne; H. E. Pitt, Ltd., builders, Millfield, Sunderland.

Blackwood.—Houses (118), for Bedwellty U.D.C.; Council architect, Fire Station Offices, Aberbargoed.

Brighton.—Development of 31 acres, Surrendon Road, Withdean; Braybons, Ltd.

Bristol.—School, Petherton Road (£22,981), for the E.C.

Bury.—Town hall (£150,000); Jackson & Edmonds, architects, 24, Bennetts Hill, Birmingham.

Cardiff.—Clinics and school centres (£14,986); city engineer.

Chanotonbury (SUSSEX).—Houses (80), Ashington, Steyning, Sullington and Washington; Ford & Harkness, architects, 12, City Road, London, E.C.1.

Curdworth (WARWICKSHIRE).—Factory (80 acres); British Oxygen Co., Ltd.

Dalkeith.—Reconstruction of Palace Cinema, for Scotts Empires, Ltd. (£15,000); the manager.

Dartford.—Houses (93), North Road; H. R. Canning. Houses (12), Wentworth Drive; J. B. Heale & Co. Extensions to foundry, Overy Street; Seagers, Ltd.

Dawlish.—Houses (62), Oak Hill and Cofton; S. F. C. Churchward, U.D.C. architect. Council Offices.

Durham.—Library, Bede Burn Road, Jarrow-on-Tyne, for the County E.C.; county architect, 34, Old Elvet, Durham.

Ealing.—Hotel, Ruislip Road (£24,697); Fassnidge, Son & Norris, Ltd., builders, High Street, Uxbridge.

Easington.—Houses (20), Seaton Lane; R.D.C. surveyor.

Edinburgh.—Houses (60), Comely Bank Grove, &c., for the Dean Property Investment Co., Ltd.; Stewart Kaye, architect, 14, Hill Street.

Enfield.—Shops and houses, Baker Street; Wates, Ltd.

Essex.—Local offices, Laurie Square, Romford (£28,200); extensions to Sutton Institution, Hornchurch (£18,941); and school, Benfleet (£48,093); county architect, Chelmsford.

Fife.—Houses (108), Methilhill; Walker & Pride, architects, Church Square, St. Andrews.

Giffnock (RENFREWSHIRE).—Houses (86); Mactaggart and and Mickel, Ltd., builders, Glasgow.

Glendale.—Houses (18), Wooler; R. Carse and Son, builders, Amble.

Grimsby.—Council offices and school, Nunsthorpe, for the T.C.

Guildford.—Houses (14), Tilehouse Farm estate; C. C. Yeates & Co.

Hampshire.—School, Testwood, Totton, and extensions to Institution, Romsey (£7,450); county architect.

Hartley Wintney.—Houses (36), five parishes; A. J. R. Watts, building surveyor, Council Offices.

Haslingden.—Houses (32), flats and shops, Longshoot; R. Taylor, borough surveyor, Municipal Offices.

Hawick (ROXBURGH).—Houses (60), Thornwood (£25,000); burgh surveyor.

Haydock.—Houses (124), Church Road scheme; R. Main, U.D.C. surveyor.

Hendon.—Cinema, Church Street; Odeon Theatre, Ltd.

Hertfordshire.—Technical college, Watford (£139,000), for the County E.C.; Lanchester & Lodge, architects, 19, Bedford Square, London, W.C.1.

Hillington (RENFREWSHIRE).—Twenty-four factories; Scottish Industrial Estates, Ltd., 41, St. Vincent Place, Glasgow.

Horwich.—Dwellings (164); U.D.C. surveyor.

Ilford.—Houses (89), Ewellhurst Road; G. W. Ansell & Son. Cinema, Fulwell Cross; G. Coles, architect, 40, Craven Street, London, W.C.2. Extensions to Isolation hospital; borough engineer.

Inverurie (ABERDEEN).—Houses (44), High Street, burgh surveyor.

Jarrow-on-Tyne.—Houses, Breamish Street; Page, Son and Bradbury, architects, 75, King Street, South Shields. School, Monkton; J. S. Weir, borough engineer, Town Hall. School in connection with St. Bede's Church; R. Burke, architect, Singleton House, Newcastle-on-Tyne.

Leeds.—Rebuilding of premises (£100,000), for Schofields (Leeds), Ltd., 79, The Headrow.

Llandilo.—Houses (20), Brewery Field; T. G. Price, U.D.C. architect, 44, Rhosmaen Street.

Llantrisant.—Houses, &c.; R.D.C. surveyor, Pontyclun.

London.—(BERMONDSEY).—Flats (31), Lynton Road (£19,716); borough engineer. (LEWISHAM).—Modernisation of Ladywell institution (£48,000); L.C.C. architect, County Hall, Westminster Bridge, S.E.1. (POPLAR).—Rebuilding Glengall school (£28,822); A. Monk, Lower Edmonton, N.9. (ROTHERHITHE).—Rebuilding of factory, Fort Street; F. J. Oldham & Sons.

Loughborough.—Houses (20), Mountsfield Drive; H. Mounteney and Son.

Luton.—Factory, for S. Hubbard, Ltd., New Street.

March.—Three shops, for Buchanan Property Trust, High Street; R. J. Sergeant.

Meriden.—Houses (70), Coleshill; R.D.C. surveyor.

Middlesbrough.—Houses (14) and three shops, Cargo Fleet Lane; Dean Brothers, builders, Marton Road.

Middlesex.—School, White Heath Avenue, Ruislip, for the County E.C.

Morecambe.—Pavilion, Harbour arena (£21,000); borough engineer.

Morpeth.—Houses (60), Stobhill; borough surveyor.

Newcastle-on-Tyne.—Houses (12), Bensham Road, for Northern Housing Development Co.; S. H. Lawson, architect, Emerson Chambers, Newcastle-on-Tyne. Houses in flats, Ovington Grove; W. Hall, Ltd., builders, Derwentwater Road, Gateshead-on-Tyne. Houses (12), Wharmlands Road; E. Jeffcock, builder, Claremont Avenue, Lemington. Hotel premises, Stamfordham Road, for A. Deuchar, Ltd.; F. M. Dryden, architect, Market Street.

Northolt.—Houses (180), West End Farm estate; T. F. Nash Construction, Ltd., Uxbridge Road, Hayes.

North Shields.—Hotel, Waterville Road; J. H. Morton and Sons, architects, Fowler Street, South Shields.

Oldbury.—Houses (190), Moat Farm estate; borough engineer.

Parton (CUMBERLAND).—Houses (74), for North Eastern Housing Association, Ltd.; R. Brown, surveyor to Ennerdale R.D.C., Council Chambers, Cleator, Cumberland.

Pecklewell (CUMBERLAND).—Houses (73), for North Eastern Housing Association, Ltd.; H. Oldfield, architect, 1, John Street, Workington.

Rawtenstall.—Houses, Booth Road estate (£50,000); Ashworth & Hobson.

Renfrewshire.—Public offices (£18,750), Maxwell Street, Paisley, for the County Council; county architect, Paisley.

Risca.—Houses (74), Taylorstown; U.D.C. surveyor.

Ruthin.—Houses (36), Cae Leo, Park Road (£12,907); Vaughan Bros., builders, Iscoed Park Road.

Sawbridgeworth.—Houses (30), Upper Bull Fields site; U.D.C. surveyor.

Sedgley.—Houses, Lower Gomal, and North Springfield; U.D.C. surveyor.

Sheffield.—Factory, Arundel Street; Pinder Bros., Ltd. Factory, Pitt Street; Portobello Steel works.

Shipley.—Houses, Grosvenor Road and Trenance Drive; H. Chippindale.

Skegness.—Buildings for Board of Management of the Skegness and District Hospital (£15,560); W. F. Wills (J. Wills & Sons), The Hall, Roman Bank. Palais de Danse, Grand Parade, for G. H. Hannam; Duke & Reekie, architects, 7, Gower Street, Bedford Square, London, W.C.1.

Solihull.—Houses (14), Lode Lane; G. Linnecor, Newtown Row, Aston, Birmingham.

Southam.—Houses (24), Stockton; R.D.C. surveyor.

Southgate.—Houses (22), Corri Avenue; Bolton & Fifield, Ltd., 20, Dering Street, London, W.1. Houses (18), Lakenheath; C. E. Ward, 1a, Aldermans Hill, London, N.13. Shops and flats, Chase Side; Marshall & Tweedy, 96, New Cavendish Street, London, W.1.

Southport.—Cinema, Lord Street and Wellington Street, for the Associated British Cinemas, Ltd.; F. Haslam, Ltd., contractors, Regent Chambers, Hallgate, Doncaster.

Stanmore.—School, Thistlecroft Gardens (£58,970); Gee, Walker & Slater, Ltd.

Stockport.—Houses (100), Reddish Vale Road, Reddish; P. Cummins, builder, 49, Franklin Street, Salford.

Sunderland.—Houses (134) in flats, Hartley Street, for North Eastern Housing Association, Ltd.; Metrovick House, Newcastle-on-Tyne; J. E. Lewis, borough engineer, Town Hall, Sunderland.

Sussex.—Additions to County school, Turkey Road, Bexhill-on-Sea, for the East Sussex E.C.

Thurstonland.—Houses (48), near Oakes Lane, Brockholes, with electrical work; U.D.C. surveyor, Town Moor Bottom, Thurstonland, Honley.

Tipton.—Houses (277), Gospel Oak estate; housing director, Municipal Buildings.

Torquay.—Extensions to Town Hall (£16,695); T. Vanstone & Sons, contractors.

Tynemouth.—Houses in flats, Glendower Avenue; J. Carruthers and Son, builders, Percy Square.

Warwickshire.—School, Southam, for the County E.C. Extensions to mental colony, Weston; county architect.

Wellington (SHROPSHIRE).—Houses (108) for R. V. Wilson, Ltd., Dawley Road; Barber and Son, U.D.C. surveyors, Church Street.

Wells (SOMERSET).—Housing estate, Everett's Close (£13,000); borough surveyor.

West Penwith.—Houses (66), Bodriggy Fields estate, Hayle (£23,413); C. Dennis & Son, Ltd., builders, Camelford, Cornwall.

Whitley Bay.—Houses (13), Pykerley Road; S. Whitehorn, architect, Station Road.

Wisbech.—Reconstruction of factory, Wisbech Produce Canners, Ltd., Lynn Street; H. W. Lindo, architect.

Wolverhampton.—Houses and clearance scheme, Moseley Village (£109,950); borough surveyor. Ice skating rink, swimming pool and café, Birmingham Road. Coseley; F. G. Marston, architect, 11, New Road, Willenhall.

Worthing.—Houses (20), parish of Clapham; R.D.C. surveyor, Council Offices, 15, Mill Road.